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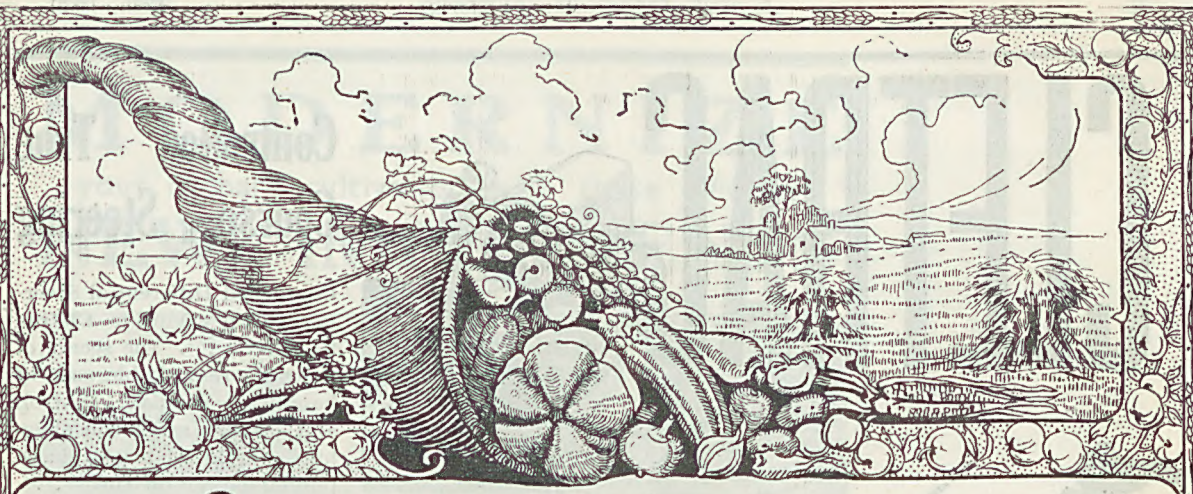

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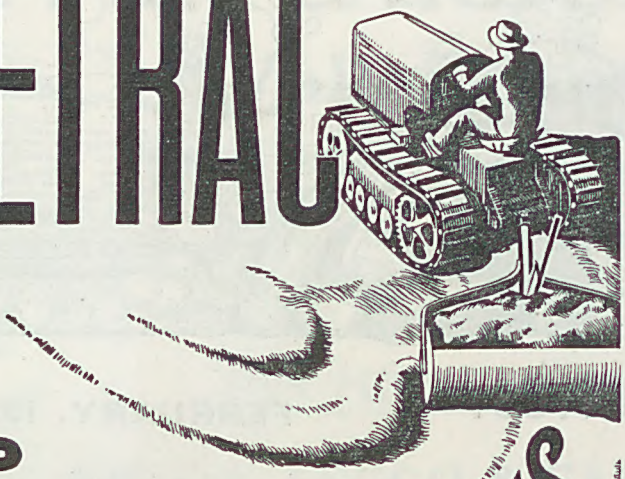

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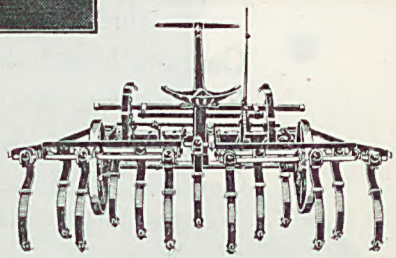

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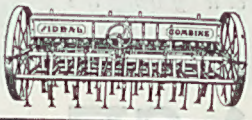

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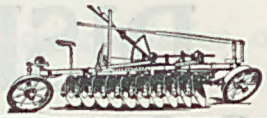

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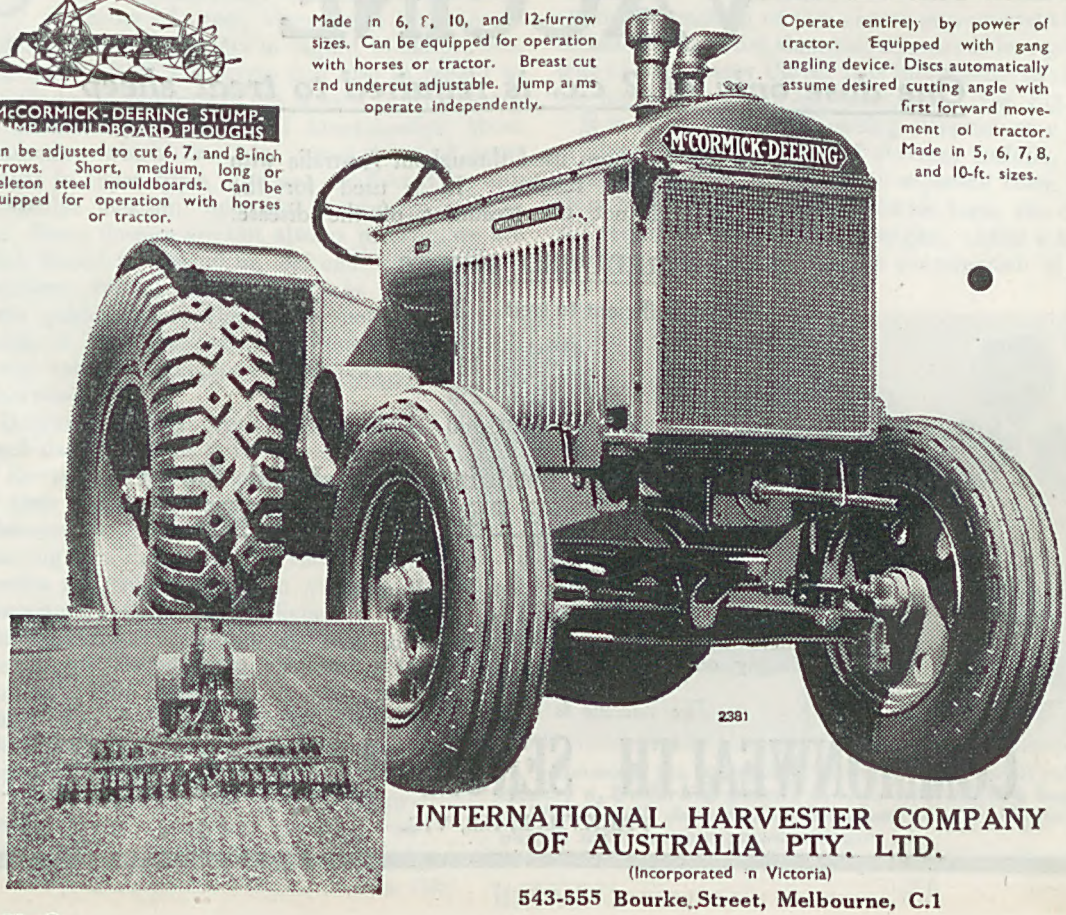

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CLOVERS & Allied Species

Their Characteristics and Identification

By A. Morgan, B.Agr.Sc., Irrigation Field Officer.

OWING to the fact that most clovers, medicks, &c., are naturally mixtures of a large number of types, showing in many cases widely diverse characters in regard to shape, size, and markings of the leaves and also in regard to the shades of colouring of the flowers, it is necessary to establish as a basis of identification those characters which are not varied to any great extent in those types, and are unaffected by any particular location, manurial treatment, and so on. Since flowers are not always present, we are often forced to depend on leaf characters such as hairiness, veining, and the like as our main guides, other characters such as shape of leaf, leaf-markings, and size being useful as evidence in support or otherwise.

Botanical survey work has supplied much data in regard to the identification of clovers and other legumes by means of their stems and leaves alone, and, wherever possible in the key accompanying this description of the various species reference is made to vegetative characters. Colour and shape of the leaf-markings are wholly unreliable as a means of distinguishing between the clovers. This should be of interest to many who hold the opinion that a white marking on the leaf is a constant character for White Clover, or that it is never found on the leaf of Strawberry Clover. Purplish markings on White Clover, and brown markings on Strawberry Clover, are not uncommon. It is not denied that certain strains of White Clover may exhibit a marking of this nature as a constant and reliable feature, but since this appears to be equally true of Strawberry Clover it is inadvisable to place too much reliance on leaf-markings. (See Fig. 1).

It is hoped that, by directing attention to a few of the structural details of clovers, trefoils, &c. those interested may learn to separate them one from another by a series of simple tests, the only aid required being normal eyesight. After a time one can dispense with a close examination of the

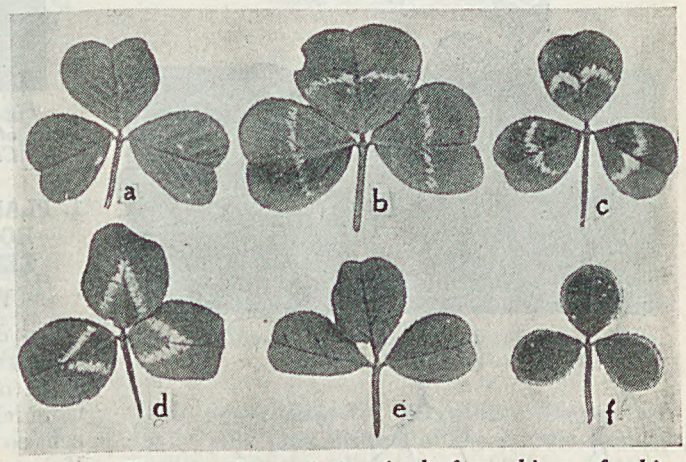

Fig. 1.—Showing the variation in leaf markings of white clover; a, Uniformly green; b, c, d, With whitish bands; e, With small, dark purple blotches; and f, Uniformly purple with narrow green margin.

[After *Erith.*

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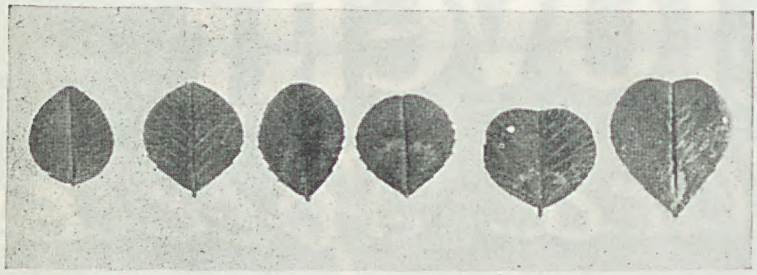

Fig. 2.—Variation in shape of leaflets of white clover.
[After *Erith*

plant, since one learns to add up unconsciously the various features which characterize a particular clover and to recognize it at a glance. It will be found, with broader experience, that no *one* character is *in itself* absolutely reliable, but that the tests described are, from a practical standpoint, satisfactory in the great majority of cases.

The problem is approached as often as possible from its most difficult angle, that is, when no flowers are present. By this means it is hoped to focus attention on characters which, while not as conspicuous as the flowers, are reliable guides. It is also assumed that the reader is unacquainted with any of the clovers, and comparisons of the different sorts in regard to general habit, situation where each is likely to be prominent, &c., are avoided in the key, although some information of this sort is given in the detailed descriptions.

We will suppose that a portion of the stem of a clover plant in a pre-flowering stage and with a few well-developed leaves is available. The first step should be to note whether the plant is one which spreads by means of creeping stems which send down roots into the soil at points near the junctions of the leaves and the stem. If it is, then the plant is a perennial, being either White Clover (in which term is included all the strains of White Clover) or Strawberry Clover. (See Fig. 3).

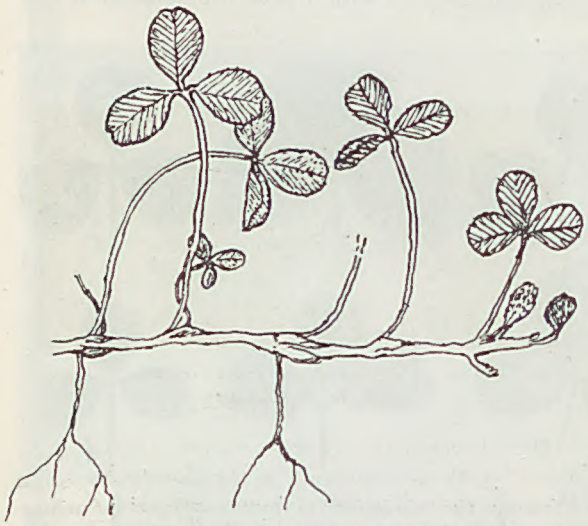

Fig. 3.—Showing creeping stem of White Clover with rootlets which are characteristic of White and Strawberry Clovers.

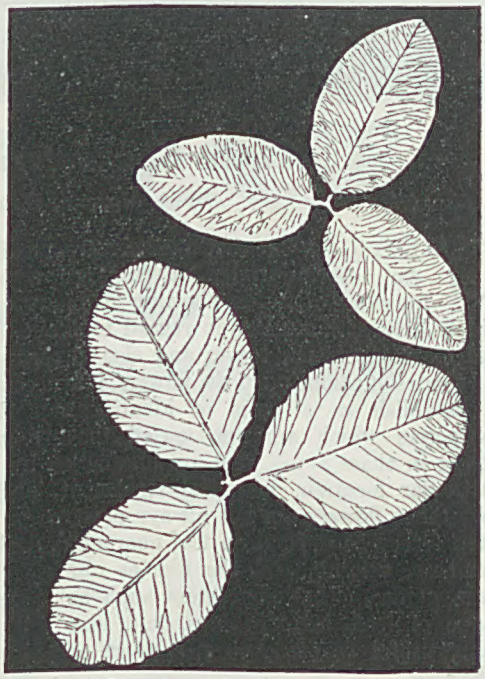

Fig. 4.—Showing different veining in leaves of White Clover (lower) and Strawberry Clover (upper).

1. PLANT WITH CREEPING STEM WHICH ROOTS AT INTERVALS ALONG ITS LENGTH.

White Clover and Strawberry Clover.

To distinguish between these two clovers, neglect such factors as leaf-markings, size and shape of leaf, since these are very variable. A more reliable method is to hold the leaf up to the light so that the veins of the leaf show up clearly. If they are widely spaced, and in the great majority of cases run straight to the edge of the leaf with only one branching, the leaf is from a plant of White Clover. If, in addition, there are no small

Fig. 5.—Calyces of (A) White, (B) Knotted, and (C) Red Clovers.
[After *Ewart.*

hairs to be seen on the leafstalk or on the under side of the leaf, no further evidence of White Clover is necessary, whether or not a white marking appears on each leaflet. If the veins are closely spaced, and very much branched, showing a curve from the midrib to the leaf edge, the leaf is from a plant of Strawberry Clover. If, in addition, a few hairs occur on the midrib of the leaf on the under side, and more frequently on the leaf-stalk, we have strong confirmatory evidence of Strawberry Clover. The hairs may be absent, however, without affecting the identification by means of the veins. The features described above are shown in Fig. 4.

Where their occurrence is brought about naturally, both White and Strawberry Clovers often will be noted as patches of a yard or more in diameter. In these patches no separate plants will be distinguishable, whereas with all other clovers a patch will readily be seen to consist of an aggregation of plants. A patch of Strawberry Clover is usually dark-green in colour, and may occur in either a rather damp or a rather dry situation, since this clover has a greater resistance to extremes of wetness and dryness than has White Clover. Both flower almost continuously through the summer months under irrigation. The flower-heads of White Clover, although *usually* white, *may* be pinkish, and invariably a strong pink or reddish tinge develops as the flowers wither. At this stage the flowers at the bottom of the head turn down towards the ground as shown in Fig. 6.

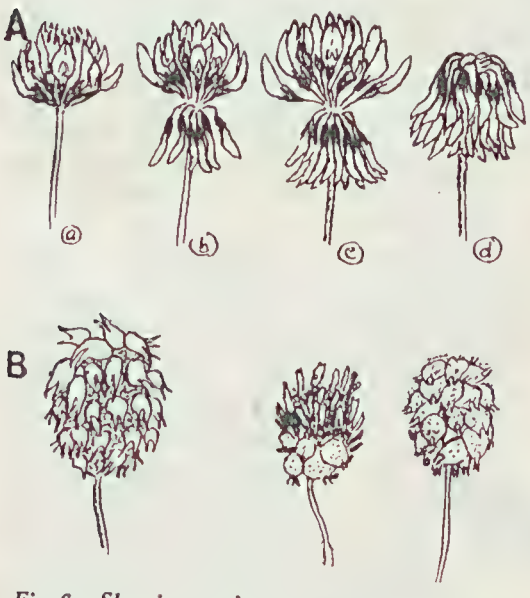

Fig. 6.—Showing various stages in the turning-down of flowers of a White Clover flower-head (A) and the characteristic "bladdery" appearance of a mature Strawberry Clover flower-head (B).

Fig. 7.—Showing the long stalk of the middle leaflet in Burr Medick.

Fig. 8.—Showing the long stalk of the middle leaflet in Hop Clover.

The flower-heads of Strawberry Clover are usually pink, and instead of the flowers turning down at withering they become bladdery, giving the characteristic "strawberry" appearance. Where possible, observations of this kind should be made in conjunction with the tests previously outlined.

2. PLANTS WITH UPRIGHT STEMS, OR STEMS WHICH DO NOT ROOT AT INTERVALS ALONG THEIR LENGTH.

A. Plants without a long stalk on the middle leaflet.

In Figs. 7, 8, and 9, the long stalk of the middle leaflet in Burr Medick, Hop Clover, and Melilotus is shown, and in Fig. 10 the stalks of the leaflets of White Clover are shown and, it will be noted, are of equal length.

Fig. 9.—Bokhara Clover—Note the long stalk of the middle leaflet. [After *Breakwell.*

In the true clovers—that is, species of *Trifolium*—two only of those occurring in Victoria have a longer stalk for the middle leaflet. These are Hop Clover and Suckling Clover. The remainder have all leaflet stalks the same length, and include the following sorts :—*Perennials*—Red Clover, Zig-zag Clover, and Alsike Clover; *Annuals*—Crimson Clover, Hare's-foot Clover, Narrow-leaved Clover, Berseem, Subterranean Clover, Knotted Clover, Rough Clover, Woolly Clover, Cluster Clover, Nodding Clover, Reversed Clover, and Suffocated Clover. Of these, none spread by means of creeping stems, as do White and Strawberry Clovers.

The division into annual and perennial species is not easy for the beginner, so the above are first divided into erect and prostrate plants.

(*a*) *Erect Plants, all Leaflet Stalks equal, no Creeping Stems with Roots at intervals.*—This group includes Red Clover, Crimson Clover, Hare's-foot Clover, Narrow-leaved Clover, Berseem, Zig-zag Clover, and Alsike Clover. They are separated as follows :—

Crimson Clover differs from the rest by having a blunt, rounded, large, leafy *stipule.* (See Fig. 11.) The stipules are two small leafy organs which occur on all the clovers and medicks at those points where the stalks of the leaves join with the stem (see Fig. 10)—they show characters peculiar to the particular kind of clover on which they occur, and are a useful means of identification with other species beside Crimson Clover.

Alsike Clover, like Crimson Clover, is easily separated from the other members of this group, being hairless, while Red Clover, Hare's-foot, Narrow-leaved, and Zig-zag Clovers are very hairy. Berseem, although hairless on mature parts, is very hairy on the young growth at the ends of the stems.

Of the hairy species (excepting Crimson Clover), Red Clover is identified by the stipule, which is broad at the base, then abruptly narrowed and ending in a fine narrow point carrying a number of long hairs (see Fig. 11). In Berseem, Hare's-foot, and Narrow-leaved Clovers the stipule is gradually tapered, the free part being long and

narrow, and the leaflets of Hare's-foot and Narrow-leaved are very long and narrow. Berseem leaflets are long, but their width is in proportion. Narrow-leaved Clover has a hard, long bristly head, up to several inches long, and Hare's-foot has a soft hairy head, less than 1 inch long usually. Red and Alsike are the most valuable members of this particular group of clovers, Berseem and Crimson are grown in small amounts, while Narrow-leaved and Hare's-foot are to be regarded as weeds.

In pastures which are being grazed the erect habit of Red Clover may be suppressed at the time of collecting the specimen, and in that case the differences in the stipules must be observed to distinguish the plant from Subterranean Clover. The stipule of Red Clover has a long, fine point which is not found with Subterranean Clover, and is heavily-veined and often coloured red along the veins, while that of Subterranean Clover is indefinitely veined (to the naked eye) and the colouring is not confined along the veins.

With these characters the shape of the leaf can be taken into consideration. It is safe to say that the leaf of Subterranean very seldom shows much difference from that illustrated in Fig. 14c, but Red Clover leaves in some cases very closely resemble those of Subterranean in shape (see Fig. 13).

Striking differences are shown in plants allowed to develop fully—Red Clover then becomes erect, while Subterranean sends out long rootless runners. While Red Clover bears its flowers in large heads of a purplish colour, at the ends of the stems, Subterranean Clover bears its small whitish (or pink-tinged) flowers in groups of three or four, between the leaves and the runner, at intervals along the latter.

It is in the high rainfall areas only that Red Clover is able to spread naturally, but Subterranean may become prominent as a result of topdressing under conditions of low rainfall. In perennial irrigated pastures, Subterranean Clover although usually included in the seeding mixture for areas where water is available on demand or at regular short intervals, should not be particularly aggressive. If it is, the inference is that

Fig. 10.—Showing the position of the stipule at the junction of leaf stalk and runner.

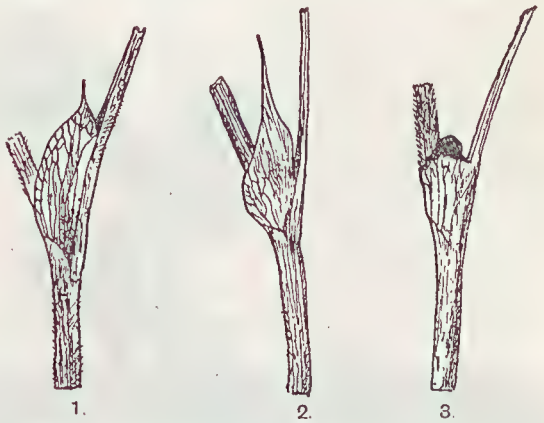

Fig. 11.—Stipules of, 1, Red; 2, Alsike; and 3, Crimson clovers.

[After *Percival.*

waterings should be more frequent. With Wimmera Rye-grass, Subterranean Clover forms a valuable annual pasture under irrigation.

Zig-zag Clover is included in this article because of its appearance in South Australia, and is described in detail later. It is similar to Red Clover in many ways, the distinctive character being the zig-zag habit of the stems.

The next group includes the prostrate true clovers, with all leaflet stalks equal in length, and without rootlets arising at intervals along the stems.

(*b*) *Prostrate Plants, all Leaflet Stalks equal, no rooting from the stems.*—Included in this section are Subterranean Clover, Knotted Clover, Rough Clover, Woolly Clover, Cluster Clover, Nodding Clover, Reversed Clover, and Suffocated Clover, also two plants with leaves similar to clovers but with long seed-pods—Bird's-foot Fenugreek and Sweet Fenugreek.

Hairiness in plants is not a very reliable character, but in this group it is sufficiently reliable for field identification, and a division can be effected on the following basis :—

Stems hairy.—Subterranean, Knotted and Rough Clovers.

Stems not hairy.—Woolly, Cluster, Nodding, Reversed, Suffocated Clovers and the Fenugreeks.

Although the aim here is to provide means of distinguishing clovers by leaf characters if possible, this method is quite unsatisfactory with the above species when preparing a key, as the differences which are apparent with experience are in degree only. Most of them occur as annuals in " natural " pastures, however, and flower early after a short vegetative period, so that flower-heads usually are present to help in the identification.

Fig. 12.—Red Clover (Trifolium pratense).

A.—Habit. B. and C.—Flower. D.—Fruit showing cap which falls off to liberate seed. E.—Seeds.

[West Aust. Dept. of Agric.

Of the hairy-stemmed species, Subterranean Clover is the most important, and the constancy of the shape of the leaflets already referred to can be used in identification (see Fig. 14c). Leaves of Subterranean Clover may not be conspicuously hairy on the upper surface, but are always very hairy on the under surface. The method employed by this annual in re-seeding is unique. The flower-heads, consisting of three fertile white or cream-coloured flowers, with a number of infertile flowers, are turned down into the soil, often burying the seed to a depth of half an inch under moist conditions. (See Figure 14.) This character should not be mistaken for the rooting which takes place along the runners of White and Strawberry Clovers. A full account of the different strains of this plant, with other information of practical value to those intending to sow annual pastures including it, is given in a pamphlet entitled "Subterranean Clover", which may be obtained free from the Director, Department of Agriculture, Melbourne, C.2.

With Rough and Knotted Clovers, the majority of the leaves are pointed, and the heads are formed of large numbers of small flowers, which, in the case of the Rough Clover, are white and in that of Knotted Clover, pink. The Knotted Clover is a very common species in areas where Subterranean is grown without irrigation, and although the tendency has been to class it as a weedy species, it produces a high percentage of leaf to stem, is palatable to stock, and has a sufficiently long-growing period to place it not far behind Subterranean. A disadvantage is that its method of re-seeding is not as efficient. Rough Clover, on the other hand, is inferior.

The species with non-hairy stems are separated as follows:—

Averaging not more than five flowers in the head.—The Fenugreeks.

Averaging more than five flowers in the head.—Woolly, Cluster, Nodding, Reversed, and Suffocated Clovers.

Sweet Fenugreek (Darling Clover) is a native annual confined to north-western Victoria, and even there it is rare. Identification of this species is easy because it is the only member of this group which has yellow flowers. The stipule is toothed to some extent, which might cause it to be mistaken for a Medick, but the leaflet stalks being equal separates it from the large number of Medicks naturalized in Victoria. Bird's-foot Fenugreek, a small annual devoid of hairs and with two or three pinkish flowers in stalked clusters at the junctions of leaves with the stem, is of common occurrence in the wetter parts of the State, and in some parts of the "stony rises" it is the dominant legume. While useful in these situations, it is not highly regarded in general. Another distinctive feature is that although in early growth it closely resembles Woolly and Cluster Clovers in habit, the margins of the leaflets are strongly toothed, but the later development of pods more than half an inch long removes the possibility of confusing it with the two species named.

Division of the section with more than five flowers in the head is based on the woolliness or otherwise of the heads, thus :—

Heads, soft and woolly.—Woolly Clover, Reversed Clover.

Heads not soft and woolly.—Cluster, Suffocated, or Nodding Clovers.

Woolly Clover is a valuable annual species in the dry areas, where it usually occurs associated with Cluster Clover, Medicks (Trefoils), and with native grasses or barley grass. Reversed Clover (Annual Strawberry) is of more limited distribution, preferring a higher rainfall. These two species are separated on flower-colour, those of Woolly Clover being a pale pink and those of Reversed Clover being pink to violet in colour.

Nodding Clover, which is sown fairly extensively in Western Australia, differs from Cluster and Suffocated in having stalked flower-heads in which the flowers turn down on withering; except when flowers are present it is indistinguishable from Cluster Clover. Cluster (Ball) Clover has a hard, round, greenish, stalkless head, in which careful examination will show small pinkish flowers; Suffocated Clover is similar except for white flowers which are very inconspicuous. Cluster Clover fulfils the same purpose in Victorian dry pastures as Woolly Clover, and although not generally sown is recognized as valuable sheep

Fig. 13.—Showing variation in shape of Red Clover leaves.

feed in appropriate districts. These clovers are also important in some wheat-growing districts as volunteers on fallows, where they can be utilized, along with weeds and annual grasses, for sheep.

B. Plants with a long stalk on the middle leaflet—The Medick and Lotus Groups.

In the earlier part of this discussion the majority of the true clovers were separated on the fact that the stalks of the leaflets were equal in length. Examination of other "natural" clovers in this State shows that the stalk of the middle leaflet is longer than that of each side leaflet. This is due to the extension of the leafstalk past the side leaflets, and the beginning of the stalk of the middle leaflet is indicated by a small swollen joint acting as a pivot when the middle leaflet folds over the remaining two at night. Species possessing this longer middle leaflet stalk are classed as Medicks for convenience. Hop and Suckling Clovers and the Melilotus species have this feature also. Most others belong to the genus Medicago.

A distinction must be made between the true Medicks and the Lotus (Bird's-foot Trefoil) species. This is made by an examination of the stipule. In the true Medicks (Trefoils), the stipule is in the position shown in Fig. 10, and is of similar general outline and venation, although usually coarsely toothed as shown in Fig. 15. In the Lotus species, there are large green organs in the position occupied by stipules in clovers and Medicks, but if one of these is held to the light to show up the veins it will be seen that in structure it is the same as a leaflet, with a midrib and two sets of smaller veins. It is, in fact, a leaflet, and the Lotus species, therefore, have five leaflets comprising each leaf, but in view of the apparent trifoliate structure of the leaf it will be convenient here to refer to the bottom pair of leaflets as "stipules."

The first step with a specimen showing a longer stalk on the middle leaflet, therefore, is to determine whether it is in the Medick group or the Lotus group—if the stipule has a midrib like a leaflet, the specimen is one from the Lotus group; if not, it is regarded as a Medick, although it may be a Melilotus species, or Hop or Suckling Clover (see Figs. 7, 8, and 9).

(*a*) *The Medicks—Stalk of middle Leaflet long, Stipule not showing midrib and veining like that of a leaflet.*—The members of this section are

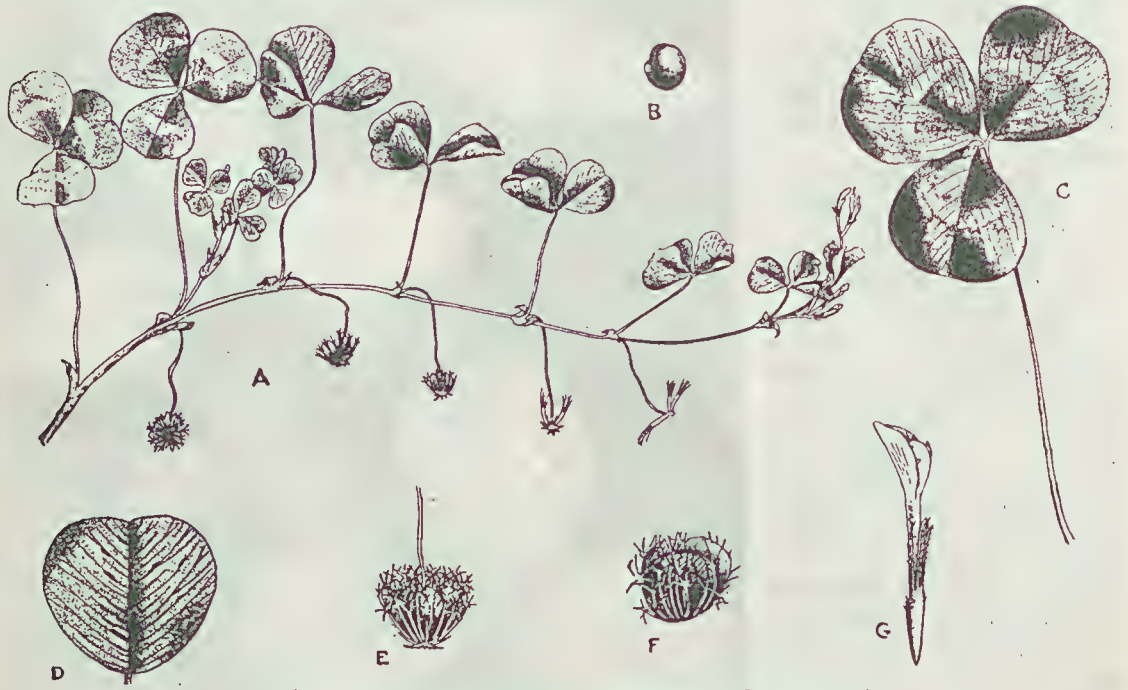

Fig. 14.—Subterranean Clover (Trifolium subterraneum)

A.—Portion of plant showing habit and development. B.—Seed. C.—Leaf showing white crescent-shaped markings. D.—Leaflet showing black flecking. E.—Maturing seed head. F.—Ripe burr. G.—Flower head.

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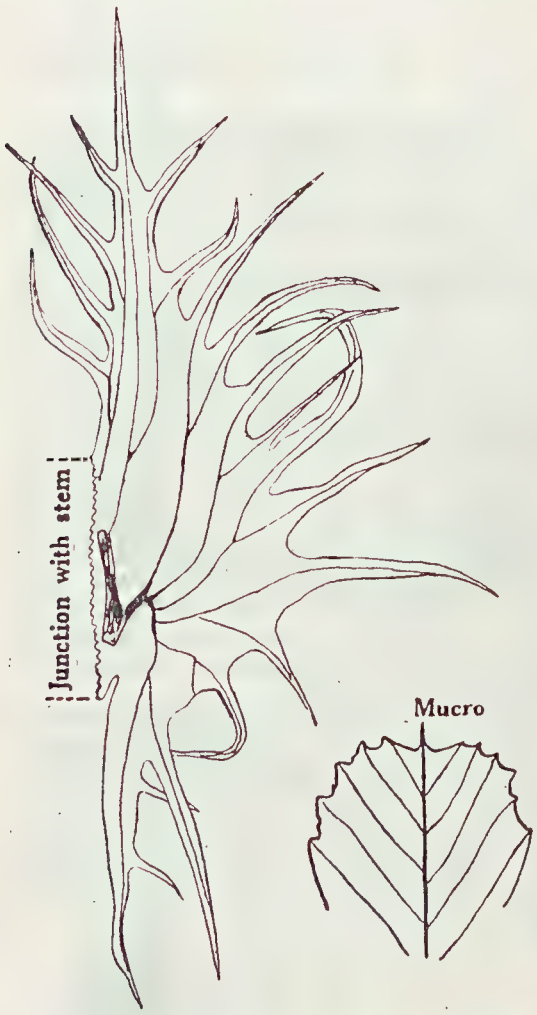

Fig. 15.—Showing teeth on stipule of Burr Medick and mucro on leaflet.

as follows:—Spotted Medick, *Medicago laciniata*, Caltrop Medick, Small Burr Medick, Black Medick, Snail Clover, Rough (Burr) Medick, Calvary Medick, Button Clover, Lucerne, Mediterranean Melilot, Bokhara Clover, King Island Melilot, Hop Clover and Suckling Clover.

The presence of teeth on the margin of the stipules, as indicated in Fig. 15 for Rough or Burr Medick, separates out the following species:—Spotted Medick, Rough Medick, *Medicago laciniata*, Caltrop Medick, Small Burr Medick, Snail Clover, Calvary Medick, Button Clover, Lucerne, Mediterranean Melilot (stipule toothed at base), Bokhara Clover (one long tooth at base of stipule). Black Medick and King Island Melilot are variable in this character, and this contingency is provided for in the key, where they are included in both sections. The remainder, including only Hop Clover and Suckling Clover, have no teeth on the edge of the stipules.

Separation of the species with toothed stipules by leaf and stem characters alone is not feasible, as only a few of these characters differ sufficiently, viz., whether the plant is perennial or annual, erect or prostrate, hairy or hairless. After exhausting these, it is necessary to rely on differences in the seed-pods. As in the case of the annual clovers occurring in "natural" pasture, seeding of the commoner medicks begins so early that it is not difficult to find a specimen sufficiently advanced for identification by this means.

Spotted Medick almost always has a large brownish or black spot on each leaflet, as shown in Fig. 16, while this spot never occurs on Rough (Burr) Medick, and this species, which is not regarded as highly by graziers as the Burr Medick, can be distinguished by the spot at all stages of growth. Of the remainder, *Medicago laciniata* (which apparently has no popular name) is distinctive because of the jagged margins of the leaflets; in fact, these have the appearance of having been severely damaged by leaf-eating insects (see Fig. 17).

Hairiness, although a variable character in most plants, differs sufficiently in degree to separate the following:—

Very hairy, with whitish leaves.—Caltrop Medick, Small Burr Medick, Black Medick and Snail Clover.

Very few hairs or none.—Rough (Burr) Medick, Calvary Medick, Button Clover, and Mediterranean Melilot.

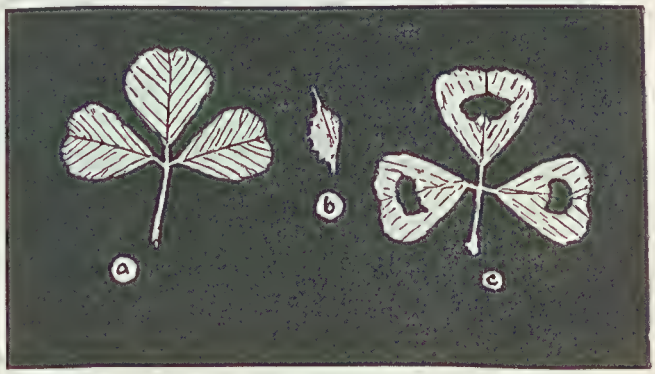

Fig. 16.—Leaves of Burr Medick (a), Spotted Medick (c), and stipule (b).

Fig. 17.—Medicago laciniata—Note the jagged margins of leaflets.

[After *Breakwell.*

Lucerne might be put in either group, but it can be taken that its perennial erect habit, its purple flowers, and the extent to which it is grown will make special provision for it here unnecessary. Black Medick on occasion may be hairy on the under side of the leaf only, but where its identification is in doubt at this stage reference to the detailed description, especially that of the flower-head and seed-pod, should be made.

We can proceed to separate the "very hairy" section as follows :—Conspicuously toothed stipules will be found on Caltrop Medick and Snail Clover, while in Small Burr Medick, Black Medick, Hop Clover and Suckling Clover the stipules are not toothed or carry only one or two small teeth. Both Caltrop Medick and Snail Clover have yellow flowers arranged in groups of from one to three on an awned stalk (see Fig. 19A for illustration of position of this awn). Both plants are very hairy and of prostrate habit, and until the seed-pods form there is no simple and reliable method of distinguishing them, but as soon as the pods are large enough to determine the nature of the spines on them, identification is simple. The absence of spines indicates Snail Clover, and the presence of conical spines points to Caltrop Medick. The pod of Snail Clover is very large, from one-half to five-eighths of an inch across, and at maturity can be confused only with Button Clover, which, as already pointed out, is not a very hairy species.

Flowers must be present to identify the members of the section with entire or few-toothed stipules. Small Burr Medick carries its yellow flowers in groups of 1 to 3, while the others have their flowers grouped in rounded yellow heads. Suckling Clover has the smallest number per head (5 to 15), while Black Medick and Hop Clover have 30 or more yellow flowers in each head. With experience

Fig. 18.—Small Burr Medick (Medicago minima).

[After *Breakwell.*

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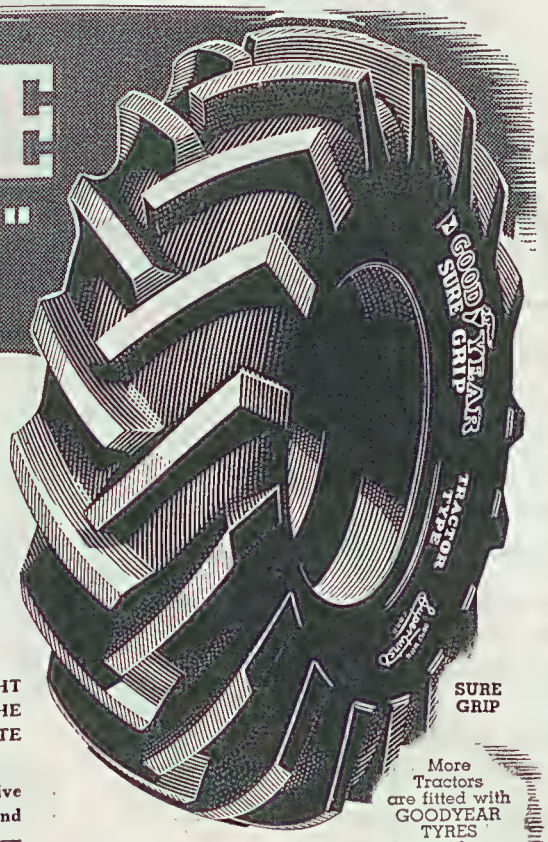

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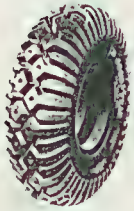

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Fig. 19.—Seed pods of Medicago species.

A.—Button Clover (a) awn. B.—Snail Clover. C.—Black Medick. D.—Rough Medick (lowest coil only).

[After *Black.*

there is little chance of confusing the two last-named, but the beginner will find it necessary to have a specimen in seed. At this stage the pod of Black Medick is not enclosed in the withered flower, is black, one-seeded, and kidney-shaped, while the pods of Hop Clover are seldom seen, being covered by the withered flower-parts.

The non-hairy or sparsely-hairy species with the long stalk on the middle leaflet and with teeth on the stipules are also separated by the flower colour and the pod spines, thus :—Lucerne and Mediterranean Melilot are erect or semi-erect plants, the former perennial and the Melilot annual; the Rough and Calvary Medicks and Button Clover are prostrate species, the first two with spiny pods and the last-named with large non-spiny pods.

Fig. 20.—"Stipule" of Bird's-foot Trefoil.

[After *Ewart.*

The agricultural value of most of the Medicks is considerable, particularly in dry areas or wherever the pasture is "natural." The Rough (Burr) Medick or "Trefoil" is probably the most important from the point of view of distribution and fodder value, and the fattening qualities of the burrs on sheep country is well-known. The Calvary Medick is practically confined to a few localities in the Western District, and is not highly regarded. It is distinguished from Rough Medick, which has from 2 to 5 coils in the pod, by having from 6 to 10 coils. In addition the spines are very long.

Rough Medick exhibits well-defined varieties differing in the degree of spininess of the "burr," and these are described later. Bokhara Clover, on the occasions when it shows a long tooth at the base of the stipule, will also be included here, but is easily identified as the only species in this section which has white flowers, borne in a long spiky head—the name is misleading, as it is a Melilotus sp. King Island Melilotus, regarded as a weed in dairying and wheat-growing districts ("Hexham Scent"), has a long narrow spiky inflorescence with yellow flowers and gives off a strong odour from the crushed leaves. Although this plant has a good reputation on the island, it is inadvisable to include it in permanent pasture sowings on the mainland, unless they are to be used solely for fattening purposes. The seeds affect the quality of wheat, 3 per cent. spoiling it for milling purposes.

Fig. 21.—Flower of Hop Clover.

[After *Black.*

(*b*) *The Lotus Group—Stalk of Middle Leaflet longer, "stipule" showing Midrib and Venation like that of a Leaflet.*—The plants in this group are extremely variable. (See key and detailed descriptions.)

A key for the identification of different clovers and allied species, together with a detailed description of each, will appear in a subsequent issue.

Tomato Culture

By

Basil P. Krone, Fruit Packing Instructor

COMPARED with other branches of fruit culture the tomato industry has made amazing progress in the commercial fruit-growing world. Less than 400 years ago, the tomato (*Lycopersicum esculentum*), a native of tropical America, was almost unknown. It belongs to the genus Solanum, which includes the Deadly Nightshade and other poisonous plants and at one time the tomato was thought to be poisonous. Actually, the leaves and the stems of the plant are poisonous, but the fruit is not. In fact, it is a very wholesome article of diet. The tomato has now been introduced into most parts of the civilized world.

Eleven years ago (1927), the total commercial acreage of tomatoes in Victoria was computed to be approximately 15,000 acres, with an estimated yield of 800,000 cases valued at £200,000, and the value of the output of the eleven foremost factories, where tomatoes were processed, was approximately £300,000. The tomato industry in Victoria was then estimated to be worth £500,000. Accurate figures are not available to show the enormous increase which has taken place in the industry since that time, but the production from one district, namely, Portland, may be of interest—In the year 1927 the output of tomatoes from Portland, in the height of the season, was approximately 500 cases per week from a radius of approximately two miles. To-day (1937–38) the district extends more than 25 miles and the output has arisen to approximately 15,000 cases per week, returning the district approximately £40,000. A yield of 600 cases per acre is considered a fair estimate, but 1,000 cases, and occasionally more, have been produced.

Dimboola is another district which was practically unheard of in the tomato-growing world ten years ago, but to-day it is impressing itself on the markets. At Shepparton, the area has increased to such an extent that three factories dealing exclusively with tomato pulp have been established. Other districts previously unrecognized for tomato culture are also rapidly developing. Among these are Robinvale, Pomonal and Mildura. In the latter district there are already a dozen or more glass houses each 100 feet long by 15 feet wide.

Soils.

The tomato is cosmopolitan in its requirements regarding soil. It can be commercially grown on many soil types, from clay to comparatively light sands. Soils of low fertility require fertilization to produce the best results. Examples of good tomato soils in Victoria are, the Murray river silts, the sedimentary soils of the Goulburn Valley, the alluvial loams of Bendigo, the light loams near Burwood, the red loams and light sands of the Mornington Peninsula, the silurian soils near Pomonal, and the black peaty loams, the red buckshot loams and sandy soils of Portland. Tomatoes grown on all these soils produce good crops. The yield of the Chinese types can be estimated at 600 cases per acre when grown on any one of them.

Whatever the type of soil, the most important feature is its physical condition. A good humus content, high fertility, and good drainage of both the soil and subsoil are desirable. These features result in a more even temperature and moisture content in the soil under varying climatic conditions than would otherwise occur. Good drainage is so important that where one is in doubt, it would be advisable to dig a few small holes about 18 inches deep on different parts of the proposed plot. Should these hold water longer than say twelve hours after a heavy rain, underground drainage is recommended.

No matter what class of soil is being used a plentiful supply of humus is necessary. If this cannot be maintained by the addition of stable manure, then rotation of cover crops should be practised. The depletion of humus in a soil through continuous cropping is frequently a cause of decline in production. Where a grower has free access to river flats, the fertility of a sandy soil can be greatly improved by top-dressing it liberally with the heavier loams, which are frequently of a silty or clayey nature, rich in potash and humus. Of course, only the surface soil should be used, such as that obtained by shallow ploughing, to facilitate its easy removal.

Drainage.

Most soils, in which it is intended to grow tomatoes, require underground drainage. The necessity for this may be determined by the method described in the previous section dealing with soils. Underground drains produce a more even temperature and more uniform moisture content in the soil; this is most important for tomato culture. Blossom end rot and other physiological troubles are known to be aggravated by irregularities of soil moisture, together with other extremes in climatic conditions. In addition, many surface soils overlie tenacious clay subsoils, which retain excess water for long periods, or the subsoil may be of a cement-like formation known as hardpan. This comparatively thin, though impervious strata should be broken up by subsoiling, and vegetable matter, such as strawy stable manure or even very small branches from bush timber, can be incorporated in the soil to prevent these layers from consolidating again.

Underground drainage is the only satisfactory method of improving badly drained land; surface drainage is not sufficient. It is recommended that short underground drains with pipes 2½ to 3 inches in diameter and 25 or 30 feet apart be placed between 3 and 4 feet deep, keeping in mind that short deep drains are always more efficient than long or shallow drains. It may be argued that drains much shallower than those stipulated are satisfactory, but in the writer's opinion, the deeper drains are better, particularly under irrigation conditions.

Sowing the Seed.

Tomato seeds should be sown very thinly, either in trays of light, but not necessarily rich, sandy soil, or in shallow drills in a sheltered seed bed. In a hot-bed the seed is frequently broadcast, or drilled thinly, about 4 or 5 seeds to the inch being ample. Another method is to broadcast the seed in one corner of the hot-bed and prick the seedlings out, just before the first pair of rough leaves appear, into the other part of the hot-bed, in rows about 4 or 5 inches apart, and 2 to 3 inches between the plants. Each row of little plants should be very slightly "hilled" to facilitate even distribution of water.

In the writer's opinion the best method is to broadcast the seeds in trays, and prick the seedlings out into other trays later. This facilitates transportation to the field at planting time without check to the young plants.

A general view of unheated glass houses in the Mildura district.

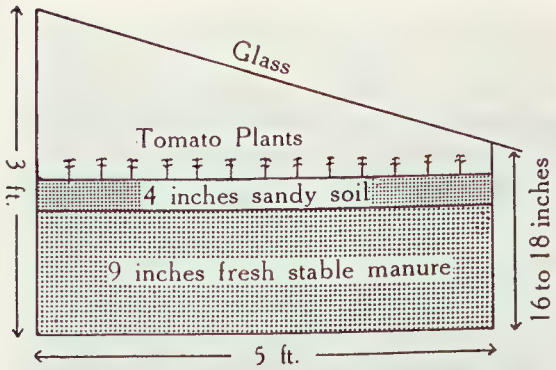
The Chinese method of creating an artificial northerly aspect to force tomatoes. The rows run east and west and maximum sunshine is provided from early morning until late afternoon. It also serves as a method of frost protection.

Where a very large acreage has to be planted, perhaps by a planting machine, one of the other methods described might be preferable, because, unfortunately, the earth has to be shaken from the roots before being planted by the machine. However, the method chosen can be decided by personal requirements. A machine plants approximately 15,000 tomato plants per day of eight hours. It is considered a very good day's work for one man to plant 1,000 plants.

Whichever method is adopted for sowing the seed, it should be covered with a thin layer of sandy soil not more than a quarter of an inch thick, or better still, a 50–50 mixture of leaf mould and sand which has been screened, or its equivalent, in order to prevent the surface cementing, cracking or drying out. The bed should then be gently watered, and if the weather is warm and the surface inclined to dry too quickly, damp newspaper, hessian, or bagging should be placed on the surface for a few days until germination is almost complete. As soon as the little plants appear, they should be thinned out to stand about half an inch apart, although in commercial practice they are usually pricked out into other trays as soon as they are large enough to handle.

When a hot-bed is not available, satisfactory results can be obtained by choosing a sheltered and sunny northerly aspect for the trays or seed bed. This provides maximum sunshine from early morning until late afternoon. The ideal situation is one that would give an even temperature of 70° F., but without the aid of artificial heat this is difficult to obtain. A warm northerly aspect can be artificially created by placing a low temporay wall of galvanized iron, wood or other material on the south side of the bed. Short

Preparation of hot-beds and cold frames for the raising of tomato seedlings.



The skillion type of hot-bed. (The sloping roof should face the north.)

walls across the east and west ends, say about 2 ft. 6 in. wide, together with a narrow roof the same width makes the situation ideal. This would be the best method to adopt in the absence of a glass house.

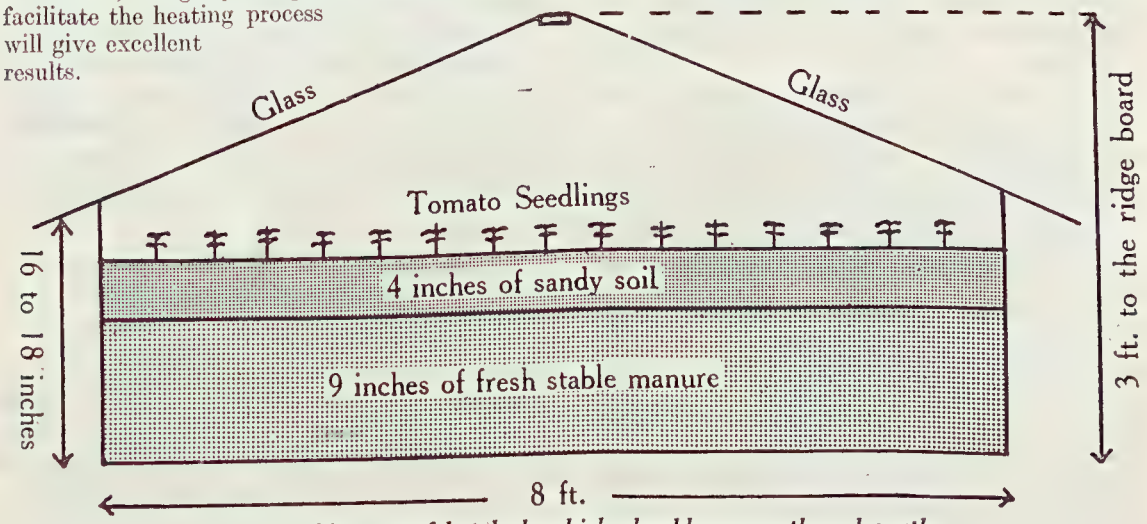
The Hot-bed and Cold Frame.

Hot-beds or cold-frames are very easily constructed and may be made almost any size to suit the requirements of the grower. The hot-bed consists of a layer of soil spread over the top of a compacted heap of fresh, strawy, stable manure, which generates heat by decomposition. If a large quantity of stable manure is difficult to procure it may be wholly or partially substituted by mixing with it, or using alone, a load or two of peas or beans which have been grown as a cover crop, or in fact any other green herbage In viticultural areas the waste stems from the dried fruit, if slightly dampened with hot water to facilitate the heating process will give excellent results.

Location, size and accessibility of the hot-bed or cold frame are important considerations. The length is immaterial, but useful widths are 6 feet or 8 feet for the gable type, and 3, 4 or 5 feet wide for the skillion type. To obtain maximum sunshine the gable type should always run north and south and the skillion type east and west with its sloping roof facing the north. A bed, say, 20 feet long by 8 feet wide will accommodate 3,200 plants when pricked out, approximately half an ounce of seed being required to provide this number of plants.

Construction.

To construct a hot-bed 20 feet long by 8 feet wide, build four walls (old galvanized iron or wood will be suitable) 18 inches high and of the size mentioned, and fix a good wide ridge board (piece of 3-in. x 2-in.) on its flat, on top of five short uprights, size 3-in. x 3-in., spaced 5 feet apart from centre to centre, and gable shape roof will be formed when the glass frames are resting on top. Into this, and to a height of 8 or 9 inches add sufficient fresh strawy stable manure which has been previously turned over several times with the fork and covered with old bags for a few days. Compact it thoroughly by tramping, then level it off. It is important to note that the thickness of the layer of manure should not be less than 8 inches. Spread over this a layer of good garden loam about 4 inches thick which has been screened and made friable by the addition of sand and leaf mould. A very fertile soil is not necessary for the hot-bed, but it must be sandy to develop a good root system. A glass cover for the top and thick bagging sewn together to cover the glass each night completes the hot-bed.



The gable type of hot-bed, which should run north and south.

Poisoning of Stock by Plants of the Sorghum Family

IT is well known that plants of the sorghum family are capable of developing, under certain growth conditions, a cyanide (prussic acid) content dangerous to grazing stock. Sudan grass is probably, however, the safest member of the sorghum family to use as a forage crop and, if reasonable care be taken, there is but little danger involved.

The following summary of an article by F. T. Boyd, O. S. Aamodt, G. Bohstedt, and E. Truog printed in the *Journal of the American Society of Agronomy*, Vol. 30, No. 7, is a useful outline of the information required in deciding whether sudan grass is safe to graze. As this information is considered important for the comparatively safe sudan grass it will be realized how much more so it should be considered when other members of the sorghum group are being used as fodder.

It is the short, dark-green sudan grass which is high in cyanide and which is dangerous to pasture. Second growth, after pasturing or removal of a hay crop, when short and dark-green is especially dangerous. Sudan grass which is 2 feet or more in height, whether first or second growth, is low in cyanide and is relatively safe to pasture. Sudan grass, short or tall, which is of a pale or yellowish green colour, is low in cyanide and is relatively safe to pasture.

Both from the standpoint of danger from poisoning and possibility of obtaining the most pasture, sudan grass should usually not be pastured until it has reached a height of 18 inches and better, 2 or 3 feet. This is best accomplished by having two or more fields so that the cattle may be rotated from one to another.

A high level of available nitrogen and a low level of available phosphorus in the soil tend to increase the poison content, while a low level of available nitrogen and a high level of available phosphorus have the opposite effect. A high cyanide content may still occur in short plants however, especially in the second growth, even though the level of available phosphorus is high. A high level of available phosphorus along with other favorable growth factors makes it possible for the plant to attain quickly a height of 2 to 3 feet, at which stage it is relatively free of poison.

Drought probably operates as a factor, largely by keeping the plants small when they are always much higher in cyanide than when larger. Drought keeps the plants small by withholding water and probably lessening the availability of phosphates to plants much more than that of nitrogen. Autumn or early spring ploughing followed by cultivation should be practised on fields to be sown to sudan grass so as to conserve moisture and prevent the ill effects of drought.

When sudan grass is dried and made into hay without undue exposure and then well stored, the cyanide content does not change greatly. Since it is usually not cut for hay until it reaches a height of 3 feet or more, there is little if any danger of cyanide poisoning from sudan grass hay. However, if short sudan grass, high in cyanide, is made into hay, it will be dangerous as a feed.

Cattle, when turned into sudan grass of high poison content, usually stop eating after about fifteen minutes, due to the action of the poison. If the animals are not too hungry and are in a state of vigor, they may stop eating before they take a fatal dose. The amount of cyanide that is fatal to cattle varies with the condition of the animals; if they are in a low state of vigor and very hungry, they are more apt to eat a fatal dose than when the opposite is the case.

The action of prussic acid is so sudden that it is rarely possible to treat an animal once symptoms become apparent. In cases where death does not occur immediately a drench consisting of half a teaspoonful of potassium permanganate and 2 lb. of glucose or molasses in a quart of water should be administered. Other cattle in the herd which are not showing symptoms should be taken from the paddock and fed freely with some other fodder, preferably lucerne.

Walpeup Fallow and Crop Competition, 1938

Report of the Judge—H. J. Sims, B.Agr.Sc., Manager Mallee Research Station, Walpeup

DESPITE the adverse season experienced in the Walpeup district of the Mallee, entries in the local competition were well maintained, and in all, twelve wheat crops and seventeen fallows were judged. The estimated yield of the crops exhibited averaged nearly 12 bushels per acre, a particularly good return for the dry season. The district average, however, would be much below this as many of the crops were severely affected by the drought conditions. Even these light crops matured well-filled grain, weighing as high as 67 lb. per bushel. Three crops eligible for the competition were withdrawn.

The rainfall received in the Walpeup township this season compared with the average registrations, was as follows:—

—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total January to October.	Total April to October.
											pts.	pts.
1938 ..	125	49	0	81	2	36	167	51	6	8	525	351
Average 26 years	63	83	86	71	132	134	114	138	146	149	1,116	884

It will be seen that the rainfall to the end of October was less than half the average, while the registration during the growing period, April to October (351 points), was only 40 per cent. of the normal amount (884 points). A feature of the rain was its patchiness, some parts of the district receiving nearly an inch less than that recorded in the township and at the Research Station. The January falls were well above average, and in some cases the fallows were worked after these rains. The fall of 60 points on the 17th and 18th April enabled many to work their fallows but other farmers who were then sowing oats were unable to give this cultivation.

In isolated cases wheat crops were sown at the end of April, but most farmers waited, expecting better sowing conditions later. In one crop inspected, a start was made with the sowing at the end of April, but it was considered too risky to continue. This early sown portion germinated well and was considerably better at harvest than that sown some five weeks later. If sowing had been continued it is thought that a fairly satisfactory germination would have resulted, and a heavier crop obtained.

Time of sowing trials have been carried out at various Mallee centres over a period of years, and in almost every instance, early sowing has given the highest average yields.

Results of Time of Sowing Trials in the Mallee.

—	Walpeup (average 5 years) 1932–36.	Carwarp (average 2 years) 1930–31.	Werrimull (average) 4 years) 1932–35.
	bus./ac.	bus./ac.	bus./ac.
Sown Early (End April)	30·2	19·1	19·9
Sown Midseason (Mid. May)	27·2	14·1	17·9
Sown Late (Early Mid. June)	24·3	10·9	14·3

It is true that in some years when good late spring rains are obtained, a late crop will benefit whereas an early crop may be already ripe, but despite this, the results show that over a period of years the earlier the sowing is carried out after the end of April the better is the average yield. This is particularly the case in a season such as 1938, with a very dry spring.

Early cropping may mean dry sowing and this may not be advisable on very dirty land or if there are hard wind-blown patches present. Also with dry sowing there may be some loss from malting or moulding of the grain. The greatest risk in this regard is experienced when the crop is sown dry and a light shower of rain (about 10-15 points), insufficient for germination, is recorded soon afterwards. Moulding and malting, however, are seldom serious now that nearly all the wheat is dry pickled. The advantages of early sowing can only be availed of to the greatest extent on land farmed so that weeds are not a serious menace.

Disease had not taken a heavy toll of any of the crops this season. Loose smut was present in most crops, and in a few entries there were traces of flag smut and root rots. The presence of ball smut in three crops makes it necessary to emphasize the importance of thorough pickling of the wheat. For complete control of this disease it is necessary that every grain should obtain a dusting of the pickle used, and therefore the wheat should not be fed through the pickler too quickly. Also sufficient quantity of powder should be used, not less than 1½ oz. per bushel with the copper dusts and 1 oz. with the mercury compounds.

The varieties most favoured by competitors were Ghurka, Ranee 4H, and Sepoy. Portions of one entry consisted of Free Gallipoli and

The variety Ghurka was exhibited by the winner of the Second Class Land section.

Dundee, while a small area of Regalia was shown in another entry. Regalia is the new variety released for distribution from the Mallee Research Station last year. It is an earlier maturing wheat than Ranee 4H and promises to take an important place among the early maturing wheats of the Mallee. It was a cross between Ranee and Free Gallipoli and was formerly known as 5807.

The varieties recommended by the Victorian Wheat Advisory Committee for the Northern Mallee are—for general sowing, Ranee 4H and Ghurka; for limited sowing, Regalia, Baldmin, Bencubbin, and Sepoy. Bencubbin is recommended particularly where a dual purpose (hay or grain) wheat is required. This variety was bred in Western Australia and was the result of a cross between Nabawa and Gluyas Early. It is a much taller variety than any of the others recommended, but in many years shows a definite straw weakness. Bencubbin has given very good yields in the experiments conducted at the Mallee Research Station.

The average amount of superphosphate used by competitors was nearly 70 lb. per acre. Tests at Walpeup over the last thirteen years have shown, that even with wheat at its present low price, an application of 90 lb. per acre on good fallowed land is warranted by the extra returns obtained.

The Awards.

The competition was for the highest aggregate of points obtained for 100 acres of fallow in 1937, and the crop grown thereon in 1938.

In the First Class Land section Mr. J. Shelley gained the first and second awards. His No. 1 entry (Ranee 4H), which was the

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best crop inspected in the competition, was grown on last year's winning fallow. The crop was well-headed, filling three grains across in many heads, and should return a good yield of at least 15 bushels per acre. It was well-grown, true to type, and free from disease and weeds. This entry was sown with a combine, with light harrows behind, in the second week of May, under dry conditions, with 60 lb. of formalin-pickled seed, and 60 lb. of superphosphate per acre.

Mr. Shelley's No. 2 entry, which was also Ranee 4H, was sown later than the No. 1 exhibit (third week in May) and was not expected to yield so well.

The Second Class Land section was won by Mr. R. R. Bell with a very attractive entry of Ghurka. The fallow had been worked after the rain in April and was combined early in May with 60 lb. of dry-pickled seed and 60 lb. of superphosphate per acre. The crop was considered to be much heavier in yield than the other entries in the section; in addition, it was practically free from weeds and disease.

Mr. J. E. Mengler, who gained second place, exhibited a crop of Ghurka and a small area of Regalia. The Ghurka was a fairly short even crop, moderately well-headed. The presence of barley and wild oats detracted from its appearance. The fallow gained second place last year and since harvest it had been worked in February and April and was combined in, with harrows behind, at the end of May with 70 lb. of superphosphate and 70 lb. of dry-pickled seed per acre.

Details of the awards are given in Table I.

The Fallows.

The dry conditions experienced this season presented little opportunity for cultivating the fallows. The majority of the paddocks had been ploughed only and sheeped; in five cases, however, one additional cultivation had been undertaken. Where this working had been given the condition of the mulch was generally better than on the fallows which had been ploughed only. All exhibits showed a few weeds and in some instances the barley grass had not been sufficiently controlled and was seeding. The elimination of barley grass is an important factor as this plant is a host of take-all and other root-rot diseases of wheat.

As would be expected in such a year most of the fallows showed a low moisture content, although in several cases it was surprisingly good. In some fallows, windblown hard patches were seen already. The presence of straw, whether short-cut oaten stubble or the longer wheaten straw, was observed to be helping to hold the drift, but its effectiveness in some instances was not all that could be desired. One has only to see fallows blown bare of mulch and the large amounts of sand

TABLE I.—100 ACRES FALLOW 1937, AND CROP GROWN THEREON 1938.

Competitor.	Variety.	Apparent Yield.	Purity and Type.	Absence of—		Evenness.	Total Crop.	Fallow Total.	Aggregate.
				Weeds.	Disease.				
Maximum Points ..	.. ..	35	20	15	15	15	100	100	200
First Class Land.									
J. Shelley, No. 1	Ranee 4H ..	32	19	14	14	13½	92½	95	187½
J. Shelley, No. 2	Ranee 4H ..	30	19	14	14	13	90	92	182
A. McKinnon ..	Ghurka and Sepoy ..	24	19	13	14	14	84	88	172
G. Pattinson ..	Ghurka, Sepoy and Ranee 4H	22	18	13	14	13	80	90	170
G. Latta ..	Free Gallipoli, Sepoy and Dundee	24	18	13	13	13	81	88	169
L. Murphy ..	Sepoy and Ranee 4H	16	19	14	12	13	74	94	168
C. J. Symes ..	Ghurka	18	17	14	14	13	76	91	167
Second Class Land									
R. R. Bell ..	Ghurka	30	18	14	14	13	89	90	179
J. E. Mengler ..	Ghurka and Regalia	24	17	12	14	14	81	93	174
J. Cooke ..	Sepoy and Ranee 4H	22	19	13½	12½	13	80	89	169
L. Murphy ..	Sepoy and Ranee 4H	16	19	14	12	13	74	94	168
O. Williams ..	Ranee 4H ..	16	18½	13½	14	13	75	92	167

Drift control investigations at the Mallee Research Station.

Left.—Even crop growing on fallow prepared by scarifying in July and ploughing later (Oct.) to leave rough surface and retain mulch. Right.—Showing patchy crop grown on normal fallow which drifted badly.

accumulating on some of the roads and fences to realize how important it is to practise any means, no matter how incomplete, which may reduce the drifting and safeguard essential services, roads, channels, railways, and buildings.

Drift control investigations are in progress at the Mallee Research Station, Walpeup, but the problem is a difficult one especially in such a dry season. The practice of sowing cover crops on the fallow is one of the methods tested at this Station for the past two years. The land is ploughed at the normal time and oats combined in on the area at the first spring working (usually late August–September). Once they are well-established, the oats are grazed according to the amount of growth made, and the stalks, roots, &c., are left on the fallow until after summer, with the object of minimizing the drift.

This season, owing to the lack of rain in the spring, there was not sufficient moisture to enable satisfactory growth to be made in the cover crop of oats, and it is evident that such a method, although it gives very good results in preventing drift in a normal season, cannot be a success in a drought year. The following is a comparison of the wheat yields obtained from this treatment and normal winter fallow:—

	Wheat Yield in bushels per acre.		
	1937.	1938.	Average 2 years.
Normal Fallow	32·8	11·8	22·3
Spring Cover Crop Fallow	31·4	10·7	21·05
Reduction in Yield ..	1·4	1·1	1·25

It will be noted that during the two years of test, the spring cover crop caused an average reduction in wheat yield of 1¼ bushels per acre. In comparing these treatments it is necessary to offset the value of the feed obtained from the cover crop against the reduction of the wheat yield.

Two competitors, Mr. G. W. Pattinson and Mr. T. Bell, this year, made attempts to check the soil from drifting on sandhills by sowing oats. The former adopted a spring cover crop method similar to the above, and sowed oats on the fallow when it was being worked over with the combine in August. The quantity of oats used was 40 to 50 lb. per acre, and these

were sown on the hills and for a distance of 10 chains from the fence along the road on the northern side of the paddock. Although the oats germinated well they were cut back by winds before reaching any useful height for grazing, and before the root system had developed sufficiently to be of use in holding the soil from drifting.

TABLE II.—100 ACRES FALLOW.

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation and Seed Bed.	Total.
Maximum points ..	25	25	25	25	100
First Class Land.					
A. McKinnon ..	20	23	23	22	88
J. E. Mengler ..	21	22	22	22	87
J. Shelley ..	22	21	21	22	86
W. Cantwell ..	21	21	22	21	85
G. Latta ..	21	21	21	22	85
C. J. Symes ..	22	21	21	21	85
G. W. Pattinson ..	21	21	22	21	85
L. Murphy ..	21	21	20	21	83
D. T. A. Bevan ..	20	21	21	21	83
Second Class Land.					
T. Bell	22	22	22	22	88
J. E. Mengler, No. 1	21	22	22	22	87
G. Latta	21	22	21½	22	86½
J. Cooke	20	22	23	21	86
F. Glen	21	21	22	22	86
C. F. Corbett ..	22	20	21	22	85
J. E. Mengler, No. 2	22	21	20	22	85
L. Murphy ..	21	21	20	21	83

The treatment adopted by Mr. T. Bell was to combine the tops of the sandhills with oats, at 30 lb. of seed per acre, in June-July, as soon as wheat cropping was completed. Sown under these earlier conditions, the oats in this instance made better growth than in the previous cases. The crop was grazed with sheep and the roots and stalks which remained assisted materially in holding the soil. Under the seasonal conditions experienced, Mr. Bell's method was certainly more successful in minimizing the drift. What effect this treatment has on the ultimate wheat yield and on weed control, however, has yet to be determined.

Mr. A. McKinnon's entry gained highest points in the First Class Land section. The paddock, which was mostly flat, had been scarified from grass in June and again scarified after the July rains. The moisture was rather low, as would be expected in heavy ground, but the fallow had been left nicely ridged and was comparatively free from weeds.

Mr. J. E. Mengler, who was placed second, prepared his fallow by sunder-cutting 2 to 2½ inches in late July from oaten hay stubble, with harrows dragging behind. The paddock had been worked dry in October, and it was still fairly well-ridged and relatively free from weeds. Mr. J. E. Mengler's No. 1 entry, which was placed second in this class, was the same fallow that gained second place in the previous section.

Mr. T. Bell's fallow, winner of the Second Class Land section, showed good moisture content. The mulch, however, was blown rather flat, but was being held fairly well by stubble from the previous crop. The top of the sandhill in this entry had been sown with oats in the manner described above. The paddock (except for the sandhill) had been mouldboard-ploughed in July, scarified in August, and sheeped throughout the year.

Whey as a Food for Pigs

WHEY is a by-product of cheese factories and consists of the water, all the milk sugar and ash, and a small percentage of protein. It makes an excellent vehicle for the crushed grain ration which is fed and the protein which, although slightly less than 1 per cent., is of high quality and supplements the protein of the grain by one of animal origin. The milk sugar present has, of course, excellent fattening properties and the ash consists of essential minerals.

Well-grown pigs weighing over 100 lb. will make excellent gains on a ration of only whey and barley or wheat, without the addition of any other supplement. Younger pigs should be given some protein—rich feed such as linseed meal or meat meal, in addition to the barley and whey, to balance the ration more completely.

It has been found in feeding trials that whey is worth about one-half as much per 100 lb. as skim milk, and its value, if it has to be purchased, may be adduced from this statement. Whey should always be pasteurized at the factory to prevent the spread of tuberculosis and it should be fed fresh and under sanitary conditions.

Rutherglen Wheat Crop Competition, 1938

Report of the Judge: J. A. Morrow, B.Agr.Sc., Manager, State Experiment Farm, Rutherglen.

WHEREAS almost the whole of the Victorian wheat areas have produced very light crops this season, the Rutherglen district farmers have harvested comparatively good crops, and eight of the exhibits in the crop competition were estimated to yield at least twelve bags per acre. Although the spring months were drier than usual, from eight to nine inches of rain were received from May to November.

In wet years low-lying soils in the Rutherglen district suffer so far as crop growing is concerned through excess water. It is recognized that comparatively dry seasons result in better crops, provided that the land is correctly managed. In the wetter seasons good yields are not so frequent, but in such years the improved pastures benefit and the extra growth, resulting as it does in greater returns from grazing activities, is more than adequate compensation for the reduced wheat yields. It rarely happens that a poor year is experienced for all phases of the district farm activities.

The dependability of the district for good crops of either cereals or pastures makes it an almost ideal locality for mixed farming. The association of pastures and cereal growing is a feature common to all farmers in the district, and methods of farm management are being evolved to make the utmost use of the areas available. The ease with which subterranean clover pastures, of a high-carrying capacity, can be established has resulted in a much improved type of lay ground, and clover is regularly used where a paddock is being spelled. Not only are these pastures profitable on account of the extra stock carried, but they also serve to build up the fertility of the soil and enable greater yields to be obtained when cropping is resumed.

A rotation system suitable for the district is suggested by this effect of the subterranean clover on the soil fertility. After a paddock has been cropped for a few years, particularly if it is showing signs of reduced yields or an increase in the amount of wild oats or disease, it should, where practicable, be sown to subterranean clover. The clover could be sown with the last crop. After the land has been in clover for a period of say four to six years, cropping could be resumed with the land improved in fertility, and the quantity of wild oats and disease reduced. Paddocks could be treated in this manner consecutively.

Modifications of this system are in operation in parts of the district, but its use could be greatly extended as it affords a method of improving fertility and gives a control of weeds and disease, the returns from the farm being increased in the meantime. The Rutherglen district therefore lends itself to a type of farming which is denied less favoured areas and which should be adopted even more widely than is done at present.

Although the entrants in the competition are amongst the best farmers in the district, and some of the crops exhibited were really outstanding, the general level of the crops throughout was very high and many crops well up to competition standard were not shown. Yields much higher than average were obtained in many cases. In the absence of a good finishing rain in October, a certain amount of "pinched" grain would be harvested, but the amount was surprisingly low in all but one or two crops.

A noticeable feature of the season's cropping was the success of the earlier maturing varieties. Throughout the competition the early varieties, Waratah and Dundee, were outstanding in the amount of growth made, and in the size and plumpness of the grain. The later varieties showed some pinching, as also did a few crops when sufficient cultivation had not been given.

In a few of the crops flag smut was prevalent. This disease can be checked by a good stubble burn, well worked fallows, growing oats in the rotation, and by the use of the resistant variety, Ghurka. Ghurka will give good yields and is recommended for areas where weeds are not likely to interfere with the growth or harvesting of the crop. Another variety suitable for the district is Baldmin, an excellent crop of which

was seen while judging the competition. Despite the tendency of this variety to be weak in the straw, and sometimes to be somewhat pinched, it is a high-yielding variety and its grain is usually of high quality. The varieties Dundee and Free Gallipoli are also suitable tall-strawed types. The variety Waratah, which is commonly grown in the district, often gives high yields, but on an average over a number of years, it has been out-yielded at the Rutherglen Experiment Farm by the varieties named above.

The crops were comparatively free from weeds, wild oats being the most common. A few saffron thistles and an occasional tare were noticed, but in neither case was the growth strong enough to interfere with yield or grain sample.

Great care had evidently been taken in maintaining the purity of the grain as the "trueness to type" in practically all the crops was of an exceptionally high standard. In judging the crops, the suitability of the grain for seed wheat purposes is considered, and the absence of "strangers" in the crop is an important factor in making a decision. In this competition the presence of "strangers" in the highest yielding crop deprived the entrant of first placing.

The Awards.

First place was awarded to Mr. E. Chandler, for a particularly good crop of Waratah. This crop was expected to yield about thirteen bags per acre, and was of a very high standard of purity. The grain was well filled, although an occasional head showed signs of slight pinching. Disease, apart from an odd "loose smut," was absent, and excepting a few wild oats the crop was free from weeds. The land was ploughed at the end of August and Wimmera scarified twice before harvest. Another cultivation was given after harvest and again before sowing. The crop was sown in May, with 75 lb. of seed and 95 lb. of superphosphate per acre.

Second placing was shared by Mr. F. E. Sudholz and Messrs. Whitehead and Milthorpe. Mr. Sudholz's crop of Waratah would not yield quite so well as the winning entry, but was quite free from weeds and the purity of type was very high. A trace of both flag smut and loose smut

RUTHERGLEN WHEAT CROP COMPETITION, 1938.

Name.	Locality.	Variety.	Yield.	Purity and Type.	Freedom from Weeds.	Freedom from Disease.	Evenness.	Total.
MAXIMUM POINTS..	..	..	35	20	15	15	15	100
E. Chandler ..	Lilliput	Waratah ..	33	20	14	14	15	96
F. Sudholz, No. 1	"Olive Hills," Great Northern	Waratah ..	32	20	15	14	14	95
Whitehead and Milthorpe	"The Hermitage"	Dundee ..	35	17	14	15	14	95
R. G. Chandler ..	Narong	Waratah ..	32	20	14	14	14	94
J. Pearse ..	Lilliput	Baldmin and Free Gallipoli	31	19	15	14	14	93
Dunn Brothers ...	Gooramadda ..	Bobin ..	32	19	13	14	14	92
F. Sudholz ..	Great Northern ..	Bobin ..	32	19	14	14	13	92
D. J. and J. T. Dunne, No. 1	Springhurst ..	Dundee ..	30	18	14	14	13	89
R. G. Chandler ..	Narong	Free Gallipoli	30	19	13	13	14	89
E. Chandler ..	Lilliput	Free Gallipoli	28	19	14	13	14	88
D. J. and J. T. Dunne (Smith's)	Springhurst ..	Dundee ..	28	19	13	14	13	87
J. Hall	Carlyle	Free Gallipoli	24	20	13	13	14	84
W. Burrowes ..	Carlyle	Ford ..	24	19	14	14	13	84
A. F. Cullen ..	"Fairfield," Great Northern	Waratah ..	24	19	14	14	13	84
Baker Brothers ..	Brown's Plains ..	Ranee 4H ..	22	19	14	14	14	83
F. Jenvey ..	Lilliput	Ranee 4H ..	19	19	14	14	14	80

NOTE.—The yield points are purely relative and do not represent estimated yields in bushels.

was noticed, but the effect on the yield would be negligible. A few blank strips, where sufficient overlap with the drill was not taken, cost the competitor a point in the award for eveness. This ground was ploughed at the end of October and harrowed immediately. It was scarified after harvest and scarified, rolled and drilled at the end of April; 70 lb. of seed and 80 lb. of superphosphate being used.

Messrs. Whitehead and Milthorpe exhibited an outstanding crop of Dundee. This crop was very dense, the grain was well filled and the entry should return the highest yield in the competition. Some wild oats and a very few thistles were present, but the crop was free from disease. The presence of a fairly large number of "strangers" caused the loss of points for "purity" and marred what otherwise would have been an exceptionally good exhibit. The paddock was ploughed 4½ inches deep in late October, harrowed in November and cultivated with a set tyned implement in February and again before seeding. It was sown in April with 70 lb. of seed and 90 lb. of superphosphate per acre. The crop germinated almost immediately and was fed off bare at the end of May.

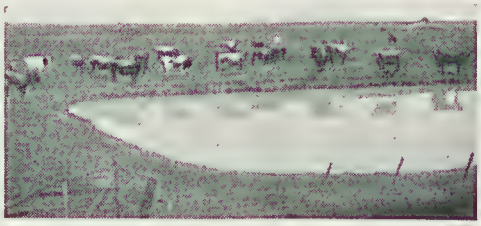
The crops of Messrs. R. G. Chandler, J. Pearse, and Dunne Brothers were also very good. The points allotted are set out in the accompanying table.

Tubercle Free Herds

The following herds have been declared free of tuberculosis under the scheme conducted by the Department of Agriculture. Under this scheme a tuberculosis-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or, upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

ACCREDITED TUBERCLE FREE HERDS.

Herd Number.	Name.	Address.	Number in Herd.	Herd Number.	Name.	Address.	Number in Herd.
1	State Research Farm	Werribee ..	190	10	Banyule Stud Pty. Ltd.	Heidelberg ..	122
2	Warragul High School	Warragul ..	35	11	McIntosh, John ..	"Burnwood," Merrigum	31
3	Payne, A. E. T. ..	"Yarra View," Lilydale	80	12	Black, Mrs. Agnes ..	Mount Noorat	40
4	Dennis, Mrs. A. A. ..	Frankston ..	14	13	Black, Estate, Late I. S.	"The Cottage," Mount Noorat	44
5	Lady Talbot Milk Supply Company	Cranbourne ..	418	14	Read, John D. ..	"Springhurst Estate," Springhurst	99
6	Reid, Ralph G. ..	"Holmwood," Koo-wee-rup	99	15	Kelly, C. ..	"Glenmore," Creighton's Creek, Euroa	22
7	Harris, J. W. ..	"Rowena," Clyde	72	16	Gorman, A. W. ..	"Cathcart," Alexandra	57
8	School of Horticulture	Burnley ..	8	17	Samuel, B. T. ..	Lang Lang ..	72
9	Lawrence, P. H. ..	"Rainga," Tarrawarra	59				



Superficial Scald in Apples

Effect of Picking Maturity, Delayed Storage and Wrappers

By G. B. Tindale, B.Agr.Sc.,* and F. E. Huelin, B.Sc., Ph.D.†

GRANNY SMITH, Stewart, and Delicious apples are cool stored in considerable quantity throughout Victoria, and every year severe losses are experienced by growers whose apples of these and other varieties develop superficial scald either during storage or shortly after removal from storage.

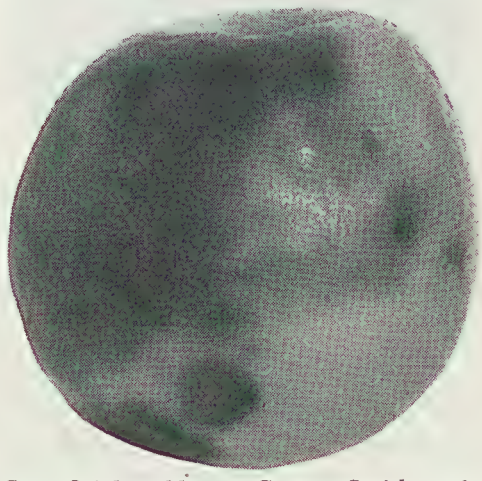
In Victoria it is a common practice to allow a period to elapse between picking and placing scald-liable varieties in cool storage, this practice being referred to as delayed storage. It is considered that such a practice exercises some control of the disorder, although the actual period of delay varies very widely among growers. From observations made during visits to Victorian cool stores, it did not appear that delayed storage was very efficient as a means of controlling superficial scald, and hence it was deemed advisable to investigate the delayed storage treatment as a control of scald, and also to compare this method of scald control with the use of oil wraps, a method so widely adopted overseas and in other States of the Commonwealth.

Before describing the actual experiments, it is advisable to give a brief description of superficial scald. It generally occurs as a light-brown discolouration of the skin of the apple, affecting green apples in particular. The area affected is usually mottled rather than wholly brown, and in this respect differs from soft scald of the Jonathan. With continued storage the scald becomes worse, i.e., the area affected enlarges and becomes darker, while the mottled effect gives way to a more or less solid area of brown. The flesh beneath the scalded area is not affected until very late in the year, when scald has become very bad. The flesh may then commence to break down.

Granny Smith.

In discussing the experiments, each variety will be dealt with in turn.

Three pickings of Granny Smith were made at fortnightly intervals from an orchard at Croydon. The dates of picking were 30th March, 13th April, and 27th April, 1938. At each picking the colour was green, and, even when compared with colour plates in a Dictionary of Colour, no advance in colour was noted with advancing maturity. However, there was a slight fall in the resistance to pressure. Using a standard U.S. penetrometer, the resistance to pressure using a 7-16th of an inch plunger was 19 lb. for the first pick, 17 lb. for the second pick, and 16 to 17 lb. for the third pick.



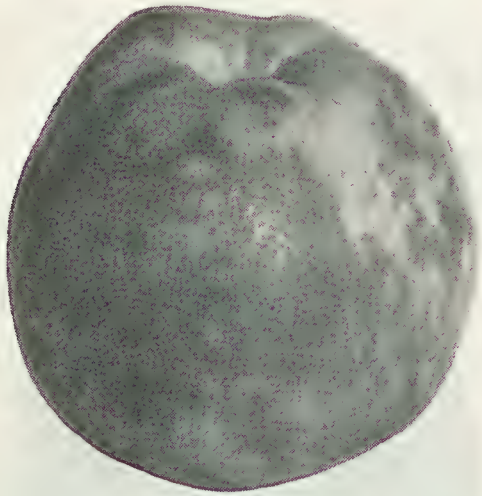
Superficial scald on a Granny Smith apple.

Half of each picking was wrapped in oil wraps, and the other half in plain wraps. Each picking was forwarded the day after picking to the experimental chambers at the Government Cool Stores. Using one case as a unit, both "oil wrapped" and "plain wrapped" fruit were subjected to the following delayed storage treatments:—

At 65°F., for 0, 2, 4, 6, 8, 10, 12, 14 days.
At 55°F., for 0, 3, 6, 9, 12, 15, 18, 21 days.
At 45°F., for 0, 4, 8, 12, 16, 20, 24, 28 days.

On completing the delayed storage treatments, the apples were immediately transferred to 34°F. for storage. They were held

* Cold Storage Research Officer of the Victorian Department of Agriculture.
† An Officer of the Commonwealth Council for Scientific and Industrial Research.



The Delicious variety showing superficial scald.

at this temperature for approximately six months, when they were removed from cool storage, and after approximately a fortnight's exposure to atmospheric temperatures were examined for scald. The results are set out in Table 1.

The most outstanding result is the complete control of scald by means of the oil wrap, whereas by using the plain wrap the development of scald was in nearly all instances very high. Referring next to the delayed storage treatments as a means of scald control, it will be seen that only in the case of the second pick, where the delayed storage period was about twelve days, was there anything like complete control of scald.

In the case of the first and third picks, delayed storage treatments had scarcely any effect in reducing scald development when compared with immediate storage. In all pickings, however, there is a definite tendency for scald development to decrease to a minimum (marked with an asterisk), and then increase again with increasing period of delayed storage. This is particularly evident with the second pick, where the percentage of scald fell to nil after twelve days' delayed storage treatment at 45° and 55°F., and almost to nil after ten days' delayed storage treatment at 65°F. After having fallen to nil or almost nil, the percentage of scald rapidly rose again with further delayed storage.

It should be stressed here that, although this falling to nil after ten to twelve days' delayed storage occurred with the second pick, yet no such results were obtained with the first and third picks, which were picked only a fortnight before and after the second pick, and which otherwise appeared to be identical with the second pick. Hence, it is extremely unlikely that a grower could pick his Granny Smith apples at the precise stage of maturity, so that, when given a delayed storage treatment for ten to twelve days, complete control of scald would result. Moreover, by adopting these delayed storage treatments, the storage life of the apple is reduced. This was well illustrated by the superior condition of the apples stored immediately compared with those given delayed storage treatments prior to storage, when the examination was made in November.

As a result of the above experiments, the conclusion is reached that it is impracticable to rely on delayed storage treatments bringing about complete control of superficial scald.

TABLE 1.—THE EFFECT OF MATURITY, DELAYED STORAGE TREATMENTS, AND WRAPPERS ON THE DEVELOPMENT OF SUPERFICIAL SCALD IN GRANNY SMITH APPLES

Scald was completely controlled by the use of oil wraps.

Delayed Storage Treatment prior to storage at 34° F.	Percentage Scald. Plain Wraps.		
	1st Pick.	2nd Pick.	3rd Pick.
Immediate Storage ..	74	48	76
4 days' delay at 45° F. ..	59	60	64
8 ,, ,, ,, ..	59	36	57
12 ,, ,, ,, ..	56*	0*	54
16 ,, ,, ,, ..	58	2	12*
20 ,, ,, ,, ..	67	12	56
24 ,, ,, ,, ..	58	37	62
28 ,, ,, ,, ..	76	65	..
Immediate Storage ..	74	48	76
3 days' delay at 55° F. ..	44*	61	62
6 ,, ,, ,, ..	57	60	17*
9 ,, ,, ,, ..	61	31	55
12 ,, ,, ,, ..	68	0*	49
15 ,, ,, ,, ..	75	0	70
18 ,, ,, ,, ..	80	22	69
21 ,, ,, ,, ..	85	0	80
Immediate Storage ..	74	48	76
2 days' delay at 65° F. ..	55	67	25*
4 ,, ,, ,, ..	74	49	32
6 ,, ,, ,, ..	73	68	60
8 ,, ,, ,, ..	28*	48	43
10 ,, ,, ,, ..	82	2*	61
12 ,, ,, ,, ..	88	78	76
14 ,, ,, ,, ..	89	40	55

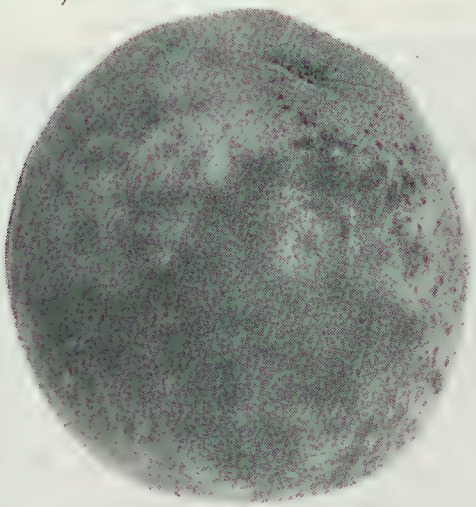
* Treatment resulting in minimum scald development.

Superficial scald, however, was completely controlled by using oil wraps, and in order to obtain maximum storage life, together with control of scald, it is recommended that Granny Smith apples be wrapped in oil wraps and cool stored promptly after picking. It is advisable to keep the apples in the oil wraps right up to marketing, as they may scald rapidly after removal from the wraps, particularly late in the year.

A similar experiment on a much smaller scale was carried out in 1937 with similar results. Then the apples were not examined until December, by which time the "plain wrapped" apples were so badly affected by scald as to be valueless. At that time the "oil wrapped" apples were just beginning to show scald. Hence, the oil wraps under certain circumstances may not completely control scald, but they will retard its development.

Stewart and Delicious.

A smaller scale experiment was conducted with the Stewart and Delicious varieties. Three pickings of each were obtained at fortnightly intervals from an orchard at Red Hill, pickings of both varieties being made on 7th March, 22nd March, and 4th April, 1938. All three picks of Stewarts were green and hard; the resistance to pressure for the first, second, and third pick being 29 lb., 29 lb., and 25 lb., respectively. The first pick of the Delicious was green, the second green-yellow, and the third yellow. The Delicious were not so hard as the Stewarts, the resistance to pressure for the three pickings being 20 lb., 18 lb., and 16 lb., respectively.



Superficial scald on Stewart.

Using one case as a unit, units of both varieties for all picks were packed in both plain wraps and oil wraps, and stored as follows:—

Immediate storage at 34°F.

Storage at 34°F. after one week at 65°F.

Storage at 34°F. after two weeks at 65°F.

The apples were stored for approximately six months, and then removed to atmospheric temperatures for a fortnight and examined for scald. The results are set out in Table 2.

As in the case of the Granny Smiths, the oil wrap gave almost complete control of scald, whereas the plain wrap was quite ineffective. Delayed storage treatments did not effect any control of scald in either variety with the first and second picks. A fortnight's delay at 65°F. with the third pick did exercise a considerable measure of control, but in this instance the life of the apple was sacrificed, because such treatment resulted in large losses due to breakdown when the apples were examined in November.

As is the case with Granny Smiths, delayed storage treatments are not recommended as a measure of scald control. Oil wraps, however, exercise almost complete control, and it is recommended that these varieties be wrapped in oil wraps and stored promptly after picking.

Table 2.—The Effect of Maturity, Delayed Storage Treatments, and Wrappers on the Development of Superficial Scald in Stewart and Delicious Apples.

Maturity.	Treatment.	Percentage Scald.			
		Stewarts.		Delicious.	
		Plain Wrap.	Oil Wrap.	Plain Wrap.	Oil Wrap.
1st Pick. 7th March, 1938	Immediate storage at 34° F.	73	Nil	88	2
	1 week at 65°, then at 34° F.	63	,,	88	Nil
	2 weeks at 65°, then at 34° F.	54	,,	72	,,
2nd Pick. 22nd March, 1938	Immediate storage at 34° F.	54	Nil	36	Nil
	1 week at 65°, then at 34° F.	55	,,	18	,,
	2 weeks at 65°, then at 34° F.	58	,,	31	,,
3rd Pick. 4th April, 1938	Immediate storage at 34° F.	35	Nil	29	Nil
	1 week at 65°, then at 34° F.	46	,,	13	,,
	2 weeks at 65°, then at 34° F.	7	,,	0	,,

The name Stewart has been used throughout this article because it is felt that that name is better known to growers It should be pointed out, however, that the official name recently approved for this variety is Ballarat.

Irrigated Pastures

Water Supply and Seeds Mixtures

By A. Morgan, B.Agr.Sc., Irrigation Field Officer.

THIS is not the time for sowing a pasture, whether temporary or permanent, but from now on those who propose to put down a paddock to a pasture mixture should begin to make their plans accordingly. The questions of what to sow, and whether a mixture of perennials will give a reasonable expectation of success, can only be answered in reference to the normal position of the block holder in regard to water supply. There is an opinion, commonly expressed, but quite erroneous, that the pasture with perennial grasses and clovers as a foundation is a heavier demander of water than lucerne.

Grazing an irrigated pasture.

The only fact on which this opinion is based is that lucerne can get along with less water than can the permanent pasture, and this advantage in favour of the lucerne is necessarily obtained at the expense of its production. In other words, lucerne will *survive* under watering treatments which would be distinctly detrimental to plants such as white clover and cocksfoot. To get the *most profitable* growth of greenstuff from both lucerne and permanent pasture, however, it has been conclusively proved that a total of 24 to 30 inches of irrigation water, depending on the average district rainfall, is required in each watering season.

The total water cost is the same in each case, but while lucerne can be allowed, if necessary, to go for long periods without watering, permanent pasture should not be sown over a considerable acreage unless it can be watered as often as every ten to fourteen days, should the necessity arise. The frequency of the watering being so important to success, the idea of putting down a mixture of white clover, perennial rye-grass, cocksfoot, and cow-grass should be abandoned or strongly modified if the way is not clear towards fulfilling this condition each season.

The possibility of growing pasture need not be discarded on this account, however. There is opportunity for great variation in the compounding of seeds mixtures, and it is often profitable to sow a combination of an intermediate character. The Wimmera rye-grass–subterranean clover mixture has a special value where water supply is restricted, and the provision of autumn–winter–spring feed, with the chance of cutting and conserving a good quality hay, is of first importance.

This mixture is usually the preliminary venture in pasture establishment on the large holding, with lucerne grown in separate paddocks for summer grazing or for hay. With the Wimmera rye-grass and subterranean clover, watering usually commences in February, and its continuance is determined by the date and quality of the " break " ; later on, one or two waterings are necessary to carry the paddock on until the plants go to seed in early summer.

With the lucerne, monthly waterings are commonly adopted on this class of property.

A number of men, however, have shown the advantages of the lucerne and pasture plant combination in which perennial rye-grass and subterranean clover can be used to balance the lucerne in regard to seasonal carrying capacity, fodder quality, and so on.

The use of subterranean clover for dry conditions is universally appreciated, whereas the drought-resistant nature of perennial rye-grass, provided it is of a good strain, is frequently overlooked. In fact, it will surprise many readers to hear that it has been sown and maintained for several years at the Werribee Research Farm, without irrigation, under an average rainfall of 19½ inches.

Another feature which makes it valuable is the ease with which it can be established over an old lucerne paddock which is thinned out to an unprofitable degree and has become a harbor for weedy grasses and weeds. Cocksfoot, although a valuable grass under irrigation, is not so easily established under these conditions, and white clover requires such care in regard to watering, that its establishment as the main clover under the conditions described can not be recommended.

Cheapness of the seed of the perennial rye-grass used should not be allowed to enter into the matter very much. The preparation of the old lucerne paddock for a pasture sowing can be done cheaply. With favorable moist soil and season, even scarifying can be dispensed with and the rye-grass is simply drilled in over the lucerne. Some part of this saving should be invested in good seed, and the purchase of Government-certified strains is undoubtedly the best investment.

The actual rates of sowing can be varied according to the individual preference for a grassy or clovery mixture, but an average practice is to use 6 to 8 lb. per acre of perennial rye-grass, and 1 to 2 lb. of subterranean clover. For sowing directly on carefully fallowed clean ground, graded and banked, lucerne would be added to this mixture at the rate of 2 to 3 lb. per acre. Manuring at sowing is essential, and should not be allowed to drop below 2 cwt. to the acre in the first and subsequent seasons.

With the lighter use of water on this type of pasture, owners are inclined to cut down on the superphosphate because they consider 2 cwt. of superphosphate per acre a dressing more suited to the requirements of the rye-grass–white clover–cocksfoot–cow-grass mixture recommended for closer settlement blocks. This view is not supported by the available evidence.

Under the average conditions of watering and grazing on the small blocks, 2 cwt. of superphosphate per acre per annum is not sufficient. It does little more than replace the phosphate removed from the farm in the can or on the hoof. The objective should be to *improve* rather than to *maintain* the fertility of the block, and as the application of this principle quickly brings its own reward in extra returns, it is strongly recommended that the standard practice on the smaller blocks should develop to 4 cwt. per acre each year, while on the larger farms growing the intermediate type of pasture, at least 2 cwt. per acre should be used as an annual dressing.

It would be expected that the successful use of light dressings would lead to a rapid increase in the amounts put on in the irrigation settlements, but strangely enough, the most progress in this direction is usually made by men new to this type of farming. As an example, I might quote the case of a Gippslander who took up a block in the Echuca district recently, and who has startled his neighbours by using superphosphate at the rate of 8 cwt. to half a ton to the acre. Judged on appearances, this revolutionary treatment has been attended with great success, and the owner has been more than satisfied with

Irrigation wild white clover.

the increased carrying capacity. A good deal of subterranean clover is present, but vigorous patches of irrigation wild white clover are showing everywhere, and if encouraged by watering will soon choke out the annuals.

The intermediate type pasture, with which we are mainly concerned in this article, is peculiarly adapted to the larger properties on account of its capabilities in both summer and winter production and its ability to stand up to watering treatment which would be prejudicial to the best mixture for permanent pasture.

The elasticity allowable in regard to watering allows the extent of subdivision to be kept well below that required for good management of the pasture in which white clover is the main legume. As watering facilities improve, or the concentration on irrigation increases and dry farming activities are curtailed, the ground is then in excellent heart for the change-over to swards with perennial clovers. The lucerne is the only constituent not able to stand up, permanently, to hard grazing, and as it dwindles its place is taken by the subterranean clover.

Butter Production and Export

The following table shows:—

(*a*) Factory production of butter and cheese in Victoria for the period July to November, 1938, compared with the corresponding period of 1937.

(*b*) Quantities and percentages of various grades of bulk butter examined in Victoria for export during the period July to December, 1938, in comparison with the corresponding period of 1937.

FACTORY PRODUCTION OF BUTTER AND CHEESE IN VICTORIA (QUANTITIES IN TONS).

Month.	Butter.		Cheese.	
	1938.	1937.	1938.	1937.
July	2,165	2,336	289	259
August	3,502 (*)	3,557	439 (*)	394
September	5,626 (*)	5,999	863 (*)	719
October	7,743 (*)	8,823	1,507 (*)	1,020
November	7.636 (*)	9,549	1,533 (*)	1,068
Totals—5 Months	26,672*	30,264	4,631*	3,460

* Subject to revision.

BULK BUTTER EXAMINED IN VICTORIA FOR EXPORT (QUANTITIES IN TONS).

Month.	1938. How Graded—				Total.	Month.	1937. How Graded—				Total.
	Ch.	1st.	2nd.	Pty.			Ch.	1st.	2nd.	Pty.	
July to November	10,502	2,575	593	34	13,704	July to November	12,055	3,985	737	39	16,816
December ..	2,834	960	273	28	4,095	December ..	3,429	2,041	369	24	5,863
Totals—6 Months ..	13,336	3.535	866	62	17,799	Totals—6 Months..	15,484	6,026	1,106	63	22,679
Percentages ..	74·9	19·9	4·9	0·3	..	Percentages ..	68·3	26·6	4·8	0·3	..

Dairy Farm Competition

Interest Well Maintained

By W. J. Yuill, Supervisor of Herd Testing.

Portion of the herd of Mr. P. Freestone, North Murchison, winner of the title of champion dairy farmer for 1938.

THAT the Council of Herd Testing established its Dairy Farm Competition in 1929 on a solid foundation is evidenced by the continuance of the competition despite one of the severest depressions the industry has ever known and, also, notwithstanding the record drought conditions through which the State is now passing.

Reference was made in last year's report, to the dry conditions then prevailing in the Western and Eastern Gippsland areas of the State. Unfortunately these conditions continued, and have generally spread throughout the State. Old settlers in the Traralgon–Sale–Maffra area state that there never has been in the history of white men, so long a period of low rainfall, as that which has existed during the past two years. Even in the well-favoured Central–South Gippsland area, there has been a serious shortage of rain.

At Mirboo North—which may be taken as a centre of this area—seventeen inches less rain fell during the July–December period of 1938, than was registered during the same period of the previous year. In such circumstances, it is surprising to find there were but ten less entries, and had it not been for the unusually low number of entries from the western zones, the competition would have been one of the most successful yet held, for Zones 3 and 8 experienced a record year.

Generally, pastures were satisfactory during the spring of 1937, and very large quantities of silage and hay were made. During 1938, however, with the exception of the Hamilton–Coleraine–Merino area—where good autumn rains were followed by timely winter falls—there was no surplus growth worth mentioning. In some areas the spring pastures were good, but generally, they lacked height and density, even well known flats did not cut as heavy as usual. On some farms no silage or hay could be harvested, and summer crops have failed badly.

In some areas—like the Kiewa Valley—the extensive fodder reserves which were eaten out have been partly replaced. Farmers thought it a good practice to feed liberally during the autumn and winter, for there was the hope that these reserves would be replaced in the spring. In some cases this did occur, for example, on the farm of Mr. J. A. Ford, a previous competition winner. Some idea of the greater need of large reserves of fodder that are needed on a well-improved farm, is apparent when it is realized, that on Mr. Ford's property more than 300 tons of silage and hay were fed out during last autumn and winter, and further, 90 head of milkers must now be provided for, compared with the previous total of less than 50 head. The value of liberal feeding was evident during September and October, when 92 cows (including 30 two-year-olds) averaged 1.58 and 1.62 lb. actual butter-fat per day.

Champion Awards.

The outstanding success of the irrigation farms was most marked during 1938, and the soundness of this type of farming is indicated by the fact that the "C.F.C." Champion Shield has been won so often by an irrigation zone. The Champion and Reserve Champion Zones, and farms, for 1938 are situated in the central irrigation areas of the State.

The Champion Shield, which was donated by Commonwealth Fertilisers and Chemicals Ltd., was retained by the North Murchison–Tongala–North Shepparton area (Zone 3) during the past year—with the 1936 winners, Rochester–Cohuna area, in the reserve position. No change has taken place on this occasion, except that the lead over Zone 4 has been materially increased. The third position was filled by Zone 10, who held the shield as far back as 1930. This latter area is making good progress, and may, in the near future, upset the winning sequence of the Goulburn Valley irrigation farms.

Mr. P. Freestone, of North Murchison, gained the coveted position of champion farmer for 1938. Mr. Freestone has been well placed every year since he first entered the Competition, and has materially helped Zone 3 to capture, and hold the "C.F.C." Shield. Three years ago he held the title, but lost it to Mr. J. Bullingham, of Tongala, in 1937, when the Champion and Reserve Champion were representatives of the same Zone. On this occasion the positions are reversed, Mr. Bullingham having suffered a set-back owing to the fact that his "new-area" is not yet sufficiently developed.

Some idea of the keen competition for leading honours, may be seen in the fact that a new reserve champion has appeared—for Messrs

Mrs. J. M. Scott's winning dairy in Zone 6.

H. E. Keele and Son, of Rochester, succeeded to this position. Their performance this year was a particularly fine one, for they were placed first or second in every section of Zone 4.

Mr. Freestone's 58 acre farm earned £816 for cream, pigs and calves, poultry and hay; the costs being £73 for fertilizer, concentrates, and irrigation charges—a gross return of approximately £14 an acre. Last year's champion farm this year had a return of £15 an acre, but scored less points per £100 of "farm value", owing to the much higher values per acre. The return of £1,340 from 86 acres is a remarkable effort however, and shows Mr. Bullingham to be a really great farm manager. The costs for water, fertilizer and concentrates amounted to £83. Messrs. Keele and Son also had unusually good farm returns, from their 147 acre farm. Mr. V. R. Neilson's 39 acre block at Tatura had the exceptionally high gross return of £17 per acre, but his costs for super, water and concentrates were also high. Mr. Geo. Brown's low "farm value" materially assisted his good management index, which is represented in his score of 120 points for Section "G". These farms have sales of lucerne hay, in addition to their dairying activities, and all are irrigationists. Similar results were obtained in the Sale–Maffra irrigation area, where Mr. Langford's returns equalled £15 per acre; while Mr. K. Stockel's splendid return of £1,707 from 128 acres showed exceptional skill in management.

In the non-irrigation areas there is no more outstanding performance than that of Mr. A. T. James, of Warrenbayne–Swanpool Association. His score of 906 points was only three points behind that of the Reserve Champion. Mr. James' excellent farm of 66 acres has not the advantage of irrigation conditions, but it is a highly developed entity of a large area that is farmed by his parents. The gross return of £14 10s. an acre eloquently tells the story of efficiency in management and control. Mr. James is a young man whose quiet persistence, and high efficiency, may at any time bring him the premier honours of the competition.

COMPETITION FOR "CHAMPION ZONE" AND POSSESSION OF C.F.C. SHIELD—BEST FOUR FARMS IN ZONE.

First—Zone 3.

	Aggregate Score.
Freestone, P., North Murchison	944
Bullingham, J., Tongala	903
Wells, R. J., North Murchison ..	856
Neilsen, V. R.	838
	3,541

Second—Zone 4.

	Aggregate Score.
Keele, H. E. and Son, Rochester	912
Pierce, J. D., Rochester ..	889
Bond, T. E., Cohuna ..	871
Semple, W., Rochester ..	820
	3,492

CHAMPION FARM.

Prizes—£10 10s. and £5 5s. donated by Meggitt Limited.

	Points.
Champion Farm—Mr. P. Freestone, North Murchison	944
Reserve Champion—Mr. H. E. Keele and Son, Rochester	912

FARM COMPETITION ZONES.

The 107 Herd Testing units throughout the State are grouped into 10 Zones as follow:—

Zone No. 1.—Walwa, Upper Murray, Tallangatta, Eskdale, Kiewa Valley.

Zone No. 2.—Myrtleford, Moyhu, Milawa, Swanpool, Alexandra, Euroa.

Zone No. 3.—Stanhope, North Murchison, North Shepparton, Tongala, Werribee, Undera.

Zone No. 4.—Cohuna, Leitchville, Kerang, Swan Hill, Pyramid Hill, Rochester, Calivil.

Zone No. 5.—Coleraine, Casterton, Condah Swamp, Portland, The Sisters, Mortlake, Warrnambool, Paschendale, Woodford, South Glenelg.

Zone No. 6.—Pomborneit, Nalangil, Beeac, Ondit-Irrewarra, Apollo Bay, Winchelsea, Dreeite South, Ballarat, Newstead, Noorat, Camperdown, Keayang, Cobden, Bacchus Marsh, Ecklin South, Geelong, Gellibrand Valley, South Purrumbete, Port Campbell.

Zone No. 7.—Orbost, Bairnsdale, Sale, Maffra, Traralgon, Yinnar.

Zone No. 8.—Warragul, Gainsborough, Jindivick–Neerim, Narracan, Boolarra, Mirboo North, Pakenham, Bunyip, Yarra Valley.

Zone No. 9.—Yarram, Toora, and Welshpool, Stony Creek, Dumbalk North, Dumbalk, Leongatha, Fish Creek, Foster.

Zone No. 10.—Wonthaggi, Loch, Mountain View, Kongwak, Poowong, Lang Lang, Korumburra, Peninsula.

Scope of Competition.

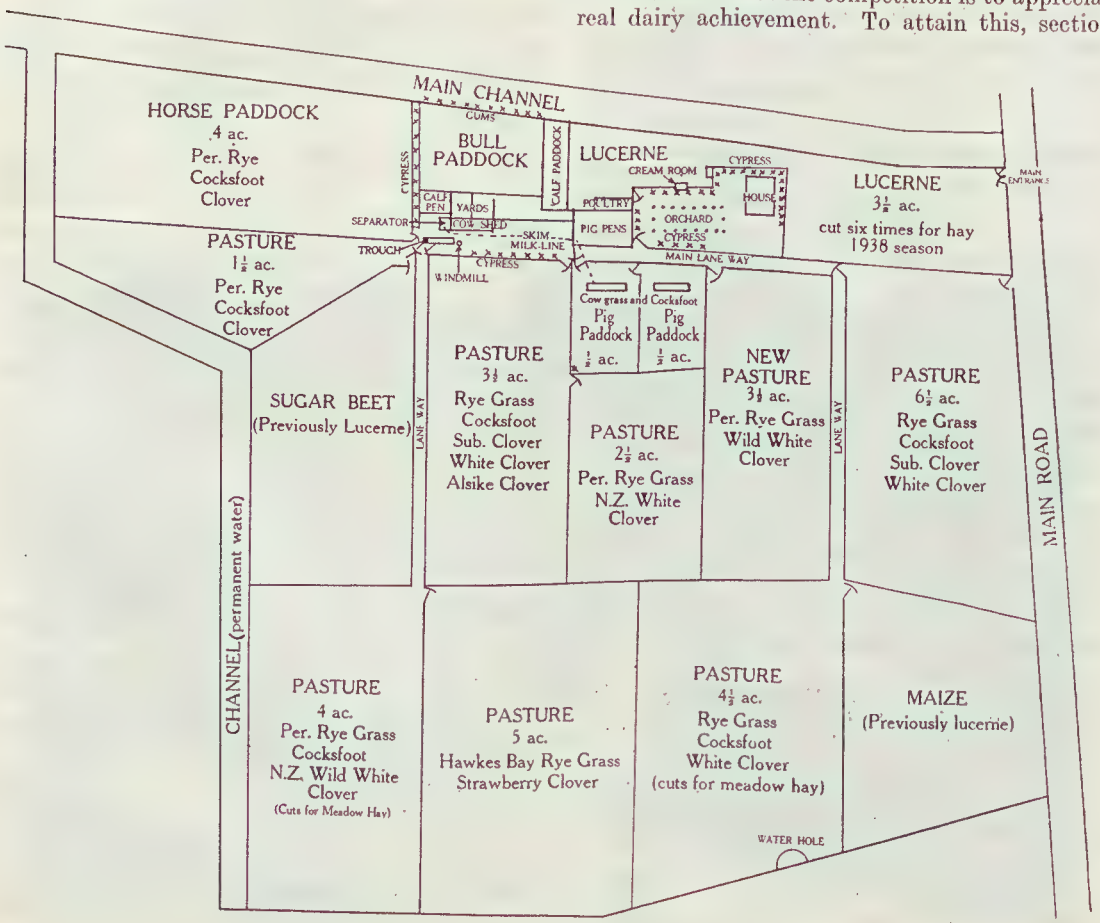
When the competition was first mooted, it was stated that new ground was being broken, in that every phase of the dairy farm would be taken into consideration. It was to be an all round dairy farm competition, not merely a section of one.

Farm layout, farm and home planning, shade and shelter, water services, book-keeping, animal health, dairy hygiene, and the care and control of the product of the dairy, were all to be featured. So, too, was each phase of the breeding, feeding and production of the herd. In no other competition has so much emphasis been placed on the importance of herd sire. Points are allotted for registration, breed type, quality of progeny and ancestral production. Finally, an equal parent index is made from the records of his mates and daughters, when such have been produced on the same farm.

Since the majority of farms are producing cream or milk for butter or cheese factories, the pig section of the farm is also inspected and breeding, housing and paddock control taken into consideration. It must not be overlooked that an additional 1½d. or more per lb. of butter-fat can be made from this source—put in another way, the gross return from pigs should at least equal 20 per cent. of the total cream cheque. The poultry section usually is conducted to provide eggs for the home only, but at times it assumes large proportions, and even rivals the pig section as a means of "marketing the skim milk."

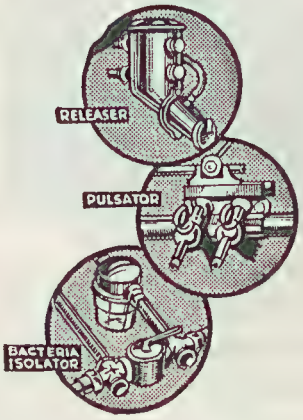
Farm development is measured by the production of butter-fat, the net returns, and carrying capacity. Pastures, legumes, root and summer crops, silage and hay for fodder reserves, together with a sound system of fertilizing, are all considered in an effort to include every worthwhile feature of the farmer's activity.

The chief aim of the competition is to appreciate real dairy achievement. To attain this, sections



Plan of Mr. W. F. Treasure's 60-acre Farm at Sale.

Owner of "Eclipse" Milker WINS CHAMPION DAIRY FARM CONTEST



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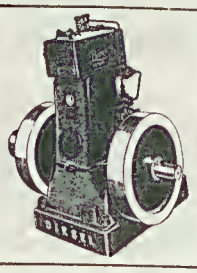

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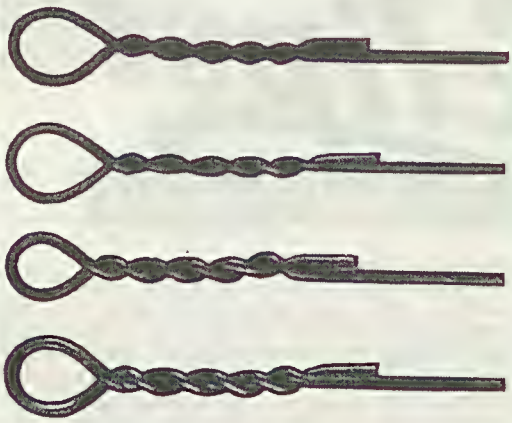

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were included which provided a means of measuring the production yield of the herd, the carrying capacity of the farm, as well as its earning capacity. By this means, the efficient dairy farmer has been able to compete more favourably with the well-to-do man; while, at the same time, a sound principle has been introduced among farmers.

A maximum of 20 points is allotted for the home. The number of points in this section was purposely kept low, so that a mansion did not have an undue advantage over the unpretentious home of the man of small means. Indeed, 15 points only can be awarded for the actual house. The balance is allotted to the orchard, gardens, lawns, hedges, shrubs, &c., which help to make a home something more than a house.

An aggregate of 105 points is allotted in the dairy section, for sheds, yards, gateways, approaches, drainage, utensils, heating apparatus, and the cooling and control of the product of the dairy. Should there be no cooler in use, the points in this sub-section are lost. If the sheds are good and the yards bad, the judge gives his award accordingly; therefore, the competitor knows just where he gains or loses points.

The scheme was drawn up by an officer of the Dairying Division of the Department of Agriculture. For a great many years, these officers have taught that it is unsound to compare farms on the production per cow, or return per-acre basis. It has been emphasized that the only sound methods are to compare the cost per lb. of butter-fat per £100 of "farm cost", or the whole of the capital cost of the farm. Capital costs on a dairy farm include land and improvements, i.e., land, buildings, fencing, water system silos, &c. Equipment and implements must be included, also stock.

Winning Farms in Section "B".

(A prize of 10 cwt. superphosphate, donated by Commonwealth Fertilizers and Chemicals Ltd., will be presented to the winner in each Zone).

Farm layout, 50 points; shade and shelter, 20 points; condition of equipment, &c., 30 points; bookkeeping, 20 points; water system, 20 points; home, 20 points; maximum, 160 points.

Zone.	Name of Competitor.	Association.	Points.
1	Crosthwaite, A. ..	Kiewa Valley ..	150
2	O'Brien, W. J. ..	Moyhu	149
3	Neilsen, V. R. ..	North Murchison	152
4	Semple, W. ..	Rochester ..	150
5	Woodruff, H. ..	Paschendale ..	146
6	Muir, J. M. ..	Bacchus Marsh ..	149
7	Langford, E. W. ..	Sale	157
8	Hardie, Mrs. A. V.	Warragul ..	158
9	Wilson, J. J. ..	Toora-Welshpool	150
10	Unthank, F. and daughter	Peninsula ..	138

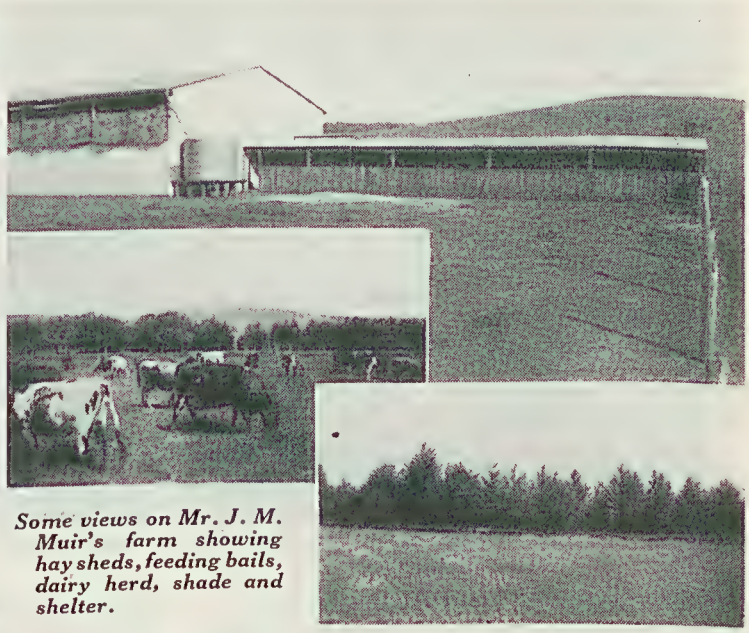
Winners in each of the ten Zones, with Details of the Various Sections.

(* Denotes Winners of Previous Competition.)

Sections of Competition.	Maximum Points.	P. Freestone,* North Murchison Association.	H. E. Keele and Son,* Rochester Association.	A. T. James,* Swanpool Association.	L. Senini,* Yarracan Association.	E. W. Langford, Sale Association.	Geo. Bright,* Dumbalk Association.	H. Woodruff, Paschendale Association.	A. Crosthwaite, Kiewa Valley Association.	J. Share,* Korumburra Association.	J. H. B. Morris, Apollo Bay Association.
Section "A."											
Dairy Area	acres	58	147	66	70	42	60	110	207	87	120
Value per Acre ..	£	20	20	18 10s.	20	30	25	17	27	25	7
Value of Dairying Area	£	1,160	2,940	1,221	1,400	1,260	1,500	1,870	5,589	2,175	840
Section "B."											
Layout of Farm ..	50	48	48	48	50	50	49	48	49	45	43
Management and Equipment	25	24	25	25	23	25	24	23	24	23	24
Shade and Shelter ..	20	19	19	18	18	18	17	16	18	18	15
Animal Health ..	5	5	..	..	..	5	..	..	..	..	..
Water Systems ..	20	20	20	20	18	20	18	20	19	16	18
Book-keeping ..	20	20	20	19	20	20	19	19	20	19	18
Home and Surroundings	20	20	18	20	20	19	20	20	20	19	18
Total Points ..	160	156	150	150	149	157	147	146	150	140	136
Section "C."											
Sheds, Yards, Drains, &c.	70	70	67	69	62	61	67	64	69	62	66
Milk and Cream Storage	25	23	25	25	23	24	23	24	24	22	24
Cooling System ..	10	10	10	10	10	..	10	10	10	10	10
Total Points ..	105	103	102	104	95	85	100	98	103	94	100
Section "D."											
Herd Sires	30	29	28	28	29	28	27	27	29	29	28
Conformation of Progeny	10	10	10	8	9	9	8	9	10	9	9
Ancestral Production ..	20	10	15	14	11	14	14	12	16	8	15
Equal Parent Index ..	40	40	40	22	25	17	40	21	19	17	25
Production per £100 of Farm	50	50	50	48	50	50	49	50	39	50	50
Herd Development ..	40	30	37	25	21	25	33	20	25	25	27
Herd Replacement ..	20	17	11	20	5	4	7	7	20	6	11
Conformation and Quality of Herd ..	30	29	29	26	27	27	29	27	29	28	28
Control of Herd Sire ..	10	9	9	9	8	10	10	9	10	9	9
Total Points ..	250	224	229	200	185	184	217	182	197	181	202
Section "E."											
Pigs and Housing ..	50	49	46	48	43	41	50	43	46	48	38
Poultry and Housing ..	20	18	18	16	16	18	18	18	16	19	13
Total Points ..	70	67	64	64	59	59	68	61	62	67	51
Section "F."											
Carrying Capacity of Farm	30	24	25	25	26	26	22	25	24	23	28
Fodder Reserves ..	50	50	50	50	50	50	28	48	50	40	..
Pastures	100	98	96	93	90	92	90	92	96	90	73
Fertilizing Practices ..	100	100	100	100	100	100	100	100	100	100	100
Total Points ..	280	272	271	268	266	268	240	265	170	253	201
Section "G."											
Net Returns	120	120	96	120	100	90	70	82	48	84	120
Grand Aggregate No. of Points..	985	944	912	906	854	843	842	834	830	819	810

For the purpose of this competition, butter-fat yields and net returns are compared in their relation to each £100 of "farm value". This term refers only to land and improvements, and not to all capital costs, since these could be controlled only in a farm costing survey.

Because farm values may vary from below £10 to over £80 an acre; and because yields of butter-fat are at times associated with a wide range of costs, farm comparisons on a per acre or per cow basis were deemed to be unsound methods of judging dairy farms. Instances are known where over 300 lb. of butter-fat was being obtained from less than £40 of "farm value"; while as high as £230 of farm value per cow had been recorded. On any single farm these methods might be satisfactorily used to measure its progress from year to year; but they are not suitable for comparing one farm with another.



Some views on Mr. J. M. Muir's farm showing hay sheds, feeding bails, dairy herd, shade and shelter.

In the early years of the competition, the average "farm cost" was found to be approximately £100 per cow, whereas now, quite generally, it is found to be between £70 and £80—a figure that is still considered to be much too high, if economic yields are to be obtained. In a recent communication from New Zealand, the Hon. W. Nash, Minister for Marketing in the Dominion House of Representatives, states, *inter alia*, that a dairy farm is efficiently capitalized, at an average figure of £75 per cow (this figure includes all capital costs). This feature has been constantly stressed during the past ten years of the competition. At all field-days, attention has been directed to the need for reducing the overhead costs. The term "farm value", however, has referred only to the land and

Winning Farms in Section "C".

(A "two-guinea order," donated by D. and W. Chandler Ltd., Hardware Merchants, will be presented to the winner in each Zone).

Sheds, yards, gateways, approaches, drainage, water heating, milking methods, separator, utensils, milk and cream storage, cooling methods—maximum points, 105.

Zone.	Name of Competitor.	Association.	Points.
1	Crosthwaite, A. ..	Kiewa Valley ..	103
2	Lester, H. W. ..	Swanpool ..	101
3	Neilsen, V. R. ..	North Murchison	103
4	Pierce, J. D. ..	Rochester ..	102
5	Denny, F. ..	Paschendale ..	100
6	Scott, Mrs. J. M. ..	Geelong ..	101
7	Pearce, E. ..	Maffra ..	102
8	MacNeil Bros. ..	Warragul ..	100
9	Wilson, J. J. ..	Toora–Welshpool	104
10	Smethurst, E. ..	Mountain View ..	99

Winning Farms in Section "D".

(A £2 2s. cash prize, donated by the proprietors of *Live Stock Bulletin*, will be presented to the winners).

Registered sire, type and quality of daughters, 40 points; production ancestry, 20 points; production index of sire's daughters, 40 points; tested cows and production of nominal butter-fat per £100 of farm value, 50 points; development of herd's production, 40 points; proportion of junior to mature cows, 20 points; inspection of herd, 30 points; bull control, 10 points; maximum points, 250.

Zone.	Name of Competitor.	Association.	Points.
1	Crosthwaite, A. ..	Kiewa Valley ..	197
2	O'Brien, W. J. ..	Moyhu	174
3	Brown, Geo. ..	North Murchison	198
4	Pierce, J. D. ..	Rochester ..	228
5	Woodruff, H. ..	Paschendale ..	182
6	Morris, J. H. B. ..	Apollo Bay ..	202
7	Treasure, W. F. ..	Sale	194
8	Hardie, Mrs. A. V.	Warragul ..	192
9	Howell, G. J. ..	Leongatha ..	215
10	Pratt, W. T. ..	Mountain View ..	188

improvements, for the reason already stated. Not anywhere else has it been made an important feature of a dairy farm competition.

Despite the record drought, entries were well up to those of previous years. However, although the competition has survived during two serious periods, the Council would like to see a larger number of entrants. In fact, the generous action of prize donors alone warrants more support from dairy farmers in the form of more entries.

It is, of course, true, that farmers in general, and dairy farmers in particular, do not enthusiastically support competitions. Some appear to have an inferiority complex. This is evident from the number who express their intention of competing later on, when they have improved certain weaknesses which must first be corrected. What

Winning Farms in Section "E".

(A cash prize of £1 1s., donated by Pig Breeders' Societies of Victoria, will be presented to the winners).

Registered boar, 5 points; quality of progeny, 10 points; appearance and quality of herd, 25 points; housing and control, 10 points; poultry, 10 points; housing, 10 points; maximum points, 70.

Zone.	Name of Competitor.	Association.	Points.
1	Crosthwaite, A. ..	Kiewa Valley ..	62
2	Lester, H. W. ..	Swanpool ..	63
3	Wells, R. J. ..	North Murchison	61
4	Semple, W. ..	Rochester ..	61
5	Woodruff, H. ..	Paschendale ..	61
6	Gent, W. and Son	Ondit–Irrewarra	65
7	Langford, A. E. ..	Sale	61
8	Dineen, C. ..	Narracan ..	55
9	Wilson, J. J. ..	Toora–Welshpool	64
10	Unthank, F. and daughter	Peninsula ..	62

Winning Farms in Section "F".

(A prize of 10 cwt. of superphosphate, donated by Commonwealth Fertilizer Co., will be presented to the winner in each Zone.)

Farm value per cow, 30 points; fodder reserve, 50 points; pasture and legume areas, 100 points; fertilizing, 100 points; maximum points, 280.

Zone.	Name of Competitor.	Association.	Points.
1	Crosthwaite, A. ..	Kiewa Valley ..	270
2	O'Brien, W. J. ..	Moyhu.. ..	270
3	Neilsen, V. R. ..	North Murchison	273
4	Semple, W. ..	Rochester ..	274
5	Denny, F. ..	Paschendale ..	266
6	Muir, J. H. ..	Bacchus Marsh ..	279
7	Langford, A. E. ..	Sale	272
8	Roberts, W. ..	Narracan ..	270
9	Horn, Wm. ..	Leongatha ..	255
10	Smethurst, E. ..	Mountain View ..	242

Winning Farms in Section "G".

(A cash prize of £1 1s., donated by the Baltic Simplex Co., will be presented to the winners.)

Maximum points, 180.

Zone.	Name of Competitor.	Association.	Points.
1	Parkhill, E. J. ..	Eskdale ..	72
2	O'Brien, W. J. ..	Moyhu.. ..	58
3	Brown, Geo. ..	North Murchison	120
4	Matthers, Mrs. E. H.	Cohuna ..	100
5	Woodruff, H. ..	Paschendale ..	82
6	Morris, J. H. B. ..	Apollo Bay ..	120
7	Langford, E. W. ..	Sale	90
8	Mason, J. ..	Narracan ..	68
9	Vagg, P. ..	Fish Creek ..	116
10	Fisher, F. ..	Loch	92

Special Classes.

(Prize of £1 1s. donated by Australian Cement Ltd. for the most extensive use of concrete in each Zone.)

Zone.	Name of Competitor.	Association.
1	Crosthwaite, A. ..	Kiewa Valley
2	Lester, H. W. ..	Swanpool
3	Wells, B. J. and Neilsen, V. R.	North Murchison (equal)
4	Semple, W.	Rochester
5	Woodruff, H. ..	Paschendale
6	Muir, J. M. ..	Bacchus Marsh
7	Pearce, E.	Maffra
8	Daymond, F. ..	Bunyip } equal
	MacNeil Bros. ..	Warragul }
9	Howell, G. J. ..	Leongatha
10	Fisher, F.	Loch

(Special prize of ½ dozen patent leg chains for highest scoring farm not winning a section prize, donated by Mr. Geo. Hayward.)

Zone.	Name of Competitor.	Association.
1	Northey, G. H. ..	Tallangatta
2	Lester, H. W. ..	Swanpool
3	Brisbane, E. J. ..	North Murchison
4	Schier, C.	Cohuna
5	Denny, F.	Paschendale
6	Moller, H. A. ..	Geelong
7	Salagari, S.	Maffra
8	White, W.	Narracan
9	Vagg, P.	Fish Creek
10	Fisher, F.	Loch

Some members of the herd of Mr. J. Bullingham.

then can be said of those who do compete ? Have they a superiority complex ? Quite generally this is not true. But it is true, that many men have a real pride of ownership or of achievement ; and it is true that they derive much satisfaction from comparing their work with that done by their fellows. The wish to compete in keen competition is but the desire to put their work to a severer test. Of course, the possibility of gaining a prize is often an added incentive, but this is surely a commendable outlook.

Although dairy farmers appear indifferent to competitions, it is wrong to assume that they lack interest. This fact is clearly shown by the large number of visitors who go privately and inspect the winning farms, sometimes the numbers become embarrassing to the successful competitors. Visitors attend these farms from near and far, and include some from the adjoining States. If any further proof were needed, it can be seen in the very large number of people who attend the public field-days. Over 500 persons attended the Annual Field-day at Maffra in September last. Nearly half of these journeyed 150 miles by the special train from Melbourne ; while others came up to 100 miles by car, from areas where live Herd Test Associations give yeoman service to the dairy farmer and the industry.

Pigs and Poultry.

Few men have done better in the pig section of the farm than Mr. S. Polmear, of the Mitta Valley–Eskdale Association. A comparison of the farm income invariably shows that efficient farmers have a gross pig return of approximately 20 per cent. of the dairy return. Mr. Polmear's return of £308 was equal to 45 per cent. of the cream cheque received for the past year. This surprising result was obtained without any purchased concentrates. In the New Zealand farm surveys, it has been found that the net return from pigs is about 2d. per lb. of butter-fat, when the farmer breeds his own pigs ; and only 1d. a lb. when he buys his pigs for fattening, while a recent official finding states that an efficient dairy farmer should make a pig return of 1½d. a lb. on his butter-fat production per cow.

Mr. V. R. Neilsen, the young Danish settler who did so well last year in Zone 3, has, like the farmers of his homeland, also done well in the pig section ; his gross return being 42 per cent. of his particularly good dairy returns. Mr. Geo. Bright's Tamworth herd is well known in South Gippsland. During the past five years, he has scored nearly twenty champion and reserve championships, in addition to more than 100 other prizes. His pig returns last year were nearly 40 per cent. of the value of his cream cheques. Several others were around the 25 to 30 per cent. mark, while at Cohuna Mrs. E. R. Matthers' pig section had a gross return of approximately £6 a week for the whole year.

The Danes and the New Zealanders are giving much attention to the development of the pig industry. In this State, and even in the competition, the returns from pigs are often unaccountably low ; on some farms, indeed, they

Four Leading Competitors in each Zone.

First Farm in each Zone receives a First Class Certificate from the Royal Agricultural Society, and a silver cup or trophy donated by the Stock and Land. Second Farm receives a Second Class Certificate.

Zone 1.

Name of Competitor.	Association.	Score.
Crosthwaite, A. ..	Kiewa Valley ..	830
Polmear, S.	Eskdale ..	809
Parkhill, E. J. ..	Eskdale ..	794
Northey, G. H. ..	Tallangatta ..	724
		3,157

Zone 2.

Name of Competitor.	Association.	Score.
James, A. T.	Swanpool ..	906
Lester, H. W. ..	Swanpool ..	792
O'Brien, W. J. ..	Moyhu	790
(No Contest)		

Zone 3.

Name of Competitor.	Association.	Score.
Freestone, P.	North Murchison	944
Bullingham, J. ..	Tongala ..	903
Wells, R. J.	North Murchison	856
Neilsen, V. R.	North Murchison	838
		3,541

Zone 4.

Name of Competitor.	Association.	Score.
Keele, H. E. and Son ..	Rochester ..	912
Pierce, J. D.	Rochester ..	889
Bond, T. E.	Cohuna ..	871
Semple, W.	Rochester ..	820
		3,492

Zone 5.

Name of Competitor.	Association.	Score.
Woodruff, H.	Paschendale ..	834
Denny, F.	Paschendale ..	788
(No Contest)		

Zone 6.

Name of Competitor.	Association.	Score.
Morris, J. H. B. ..	Apollo Bay ..	810
Moller, H. A.	Geelong ..	792
Muir, J. M.	Bacchus Marsh ..	774
Scott, Mrs. J. M. ..	Geelong ..	756
		3,132

Zone 7.

Name of Competitor.	Association.	Score.
Langford, E. W. ..	Sale	843
Treasure, W. F. ..	Sale	825
Salagari, S.	Maffra ..	809
Pearce, E.	Maffra ..	807
		3,284

Zone 8.

Name of Competitor.	Association.	Score.
Senini, L.	Narracan ..	854
Hardie, Mrs. A. V. ..	Warragul ..	804
White, W.	Narracan ..	772
Randall, W.	Warragul ..	771
		3,201

Zone 9.

Name of Competitor.	Association.	Score.
Bright, G.	Dumbalk ..	842
Wilson, J. J.	Toora–Welshpool	839
Howell, G. J.	Leongatha ..	833
Vagg, P.	Fish Creek ..	824
		3,338

Zone 10.

Name of Competitor.	Association.	Score.
Share, J.	Korumburra ..	819
Poole, D. and M. A. ..	Lang Lang ..	796
Smethurst, E. ..	Mountain View ..	779
Pratt, W. T.	Mountain View ..	779
		3,173

appear to be lower than a reasonable value for the herd's skim-milk production. Where skim-milk is fed alone to pigs, it must be reckoned as a poor method of utilizing good feeding material; especially in a land where there is a superabundance of wheat, barley, peas and maize.

At Paschendale, Mr. F. Denny looks to his White Leghorns to help increase the farm returns. His large roomy scratching-pens house 400 layers. The pens have an automatic watering and feeding system. Large petrol drums, that hold about three bags of dry mash, are filled when necessary, between the milking periods. Skim milk and curds are available at all times, both for layers and growers. All the scratching pens and chicken runs are supplied with water from a large tank through a ball-tap service. The annual gross return from poultry is approximately £4 per week.

Miss Freda Unthank, at Hastings, has a large number of Rhode Island Red fowls and many geese; while Mr. F. Fisher, of Loch Association, pins his faith to Khaki Campbell ducks. Mr. Share, of Korumburra, has a very nice lot of Black Orpingtons; while Mrs. Poole, of Lang Lang, had a great line of turkeys. Quite a number of farms had a weekly income of about 10s. from the poultry section, in addition to the needs of the home.

High Producing Herds.

A number of farms had factory incomes that exceeded £1,000, one of the largest being Mr. K. Stockel's £1,700, at Maffra, from an area of 128 acres. No concentrates were purchased for the herd. Mr. J. Bullingham received more than £1,330 from his 86 acres. Although his bill for concentrates was £9 for the year, these were used exclusively for pigs and poultry. Messrs. H. E. Keele and Son, of Rochester—the new reserve champion—had a gross farm return of nearly £1,700 from 147 acres. This herd has been steadily built up over many years of test work from a few wonderful foundation grade cows. When Dr. John Hammond, of Cambridge, visited this farm last year, he was loud in his praise of the size, quality, and substance of the dairy cows. Last year's herd average for 49 cows was 423 lb. of butter-fat, and there were many junior cows in this number.

Cutting lucerne on the farm of Mr. L. Senini, Narracan.

Mr. W. Semple's small herd of eleven cows averaged 445 lb. butter-fat, while the herd of Mr. Geo. Bright, of Dumbalk, has the following remarkable figures for the past five years (with allowances)—433, 448, 432, 409, and 429 lb. butter-fat in 1938. Mr. J. Bullingham's herd (two top crosses of Friesian over nondescript stock) averaged 10,273 lb. milk and 379 lb. butter-fat for 42 cows without concentrates. Mr. A. Crosthwaite's 62 cows averaged 314 lb. butter-fat in a seriously dry summer; while

A Lambertiana cypress hedge on the property of Mrs. J. M. Scott, Geelong, provides excellent shelter for the Jersey herd.

Homestead and dairy buildings of Messrs. MacNeil Bros., Warragul, who won the dairy sanitation and concrete section of their zone.

Mr. G. J. Howell's widely known herd had more "over 500 lb. butter-fat cows" than any other herd in the association herd test. Mr. J. D. Pierce's Rochester herd averaged 422 lb. butter-fat. The champion farm of Mr. P. Freestone, and that of Geals Bros.—both of North Murchison—exceeded 370 lb.; while Mr. W. Pratt's 39 cows at Mountain View averaged 10 lb. less.

Concrete on Dairy Farms.

In the present competition, a special prize was donated in each Zone, by Australian Cement Ltd., for the most extensive use of concrete about the home and farm. While it was generally known that concrete had increased in favour as a building material, the degree to which this had developed was not really appreciated. A check up on all farms revealed the real significance of this development.

At Bacchus Marsh, Mr. J. M. Muir has nearly 6,000 square feet about his dairy premises. Mr. H. A. Moller and Mrs. J. M. Scott, of the Geelong Association, each have more than 4,600 square feet; while Mr. E. Pearce, of Maffra, also has a very large area; so, too, has Mr. F. Daymond, of Narracan. Mr. G. J. Howell, of Leongatha, has nearly 4,000 square feet, while Mr. F. Fisher, of Loch Association, has concrete in every shape and form about his little farm at Krowera.

In No. 1 Zone, Mr. A. Crosthwaite leads; while Mr. A. T. James and Mr. H. W. Lester, of Zone 2, have extensive areas in their cow-sheds and pig yards. In the Champion Zone, Mr. R. J. Wells and Mr. V. R. Neilsen, of North Shepparton, have concrete homes, as well as large areas about their farm buildings, and other features of their holdings.

Among the common uses to which one sees concrete put, in addition to homes, floors and drainage of all kinds of sheds, is quite a variety of troughs, including the popular "candy trough". At times, the wall bases—or plinths—of dairy buildings, as well as the bail divisions and feed boxes, are also of concrete. The irrigation farmer finds it useful for permanent water-level stops in his main channelling.

Mr. G. J. Howell, of Leongatha, has largely solved the mud trouble, by constructing a "walkaway" or concrete footpath, 110 feet long by 18 inches wide. At Mr. F. Daymond's, Narracan, a 200 ton silo has been built. Sometimes the walls of silage and other pits are constructed of concrete. Mr. F. Fisher, of Loch, has over a mile of fencing, which has been erected with home-made concrete posts. These are said to cost about one shilling each (exclusive of labour).

Messrs. MacNeil Bros. and F. Daymond, of Zone 8, have made an extensive and varied use of concrete. The former has concrete floors in his milking shed, feed room, dairy, wash-up room, cowyards and drains. Similar floors have been laid in the tool house, stable, garage, wash-house and lavatory. Other uses have been found

A permanent water supply is a very important feature on the dairy farm.

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in the underground tank, engine, separator and pump bed; as well as the dog kennel, crazy footpath, porch and doorsteps. In addition to most of these, Mr. Daymond has a large manure pit—the 200 ton silo already referred to—and approaches to his main dairy buildings. The development of concrete, together with the provision of a good water service for cleansing the surfaces, must have a marked influence on the quality of the produce from such farms, for the dust of summer and the mud of winter has been largely minimized.

Sweeping grass hay in the Caldermeade district.

Dehorning.

It would not be too much to claim that the dehorning of dairy cattle also has a beneficial influence on cream quality. This, at first, would appear to be a difficult statement to prove; but it is known beyond all doubt that a herd when dehorned can be accommodated on less than half of the area required for horned cows; and that some farmers have dehorned their herds because they were able to concrete the smaller yard area then needed. Dehorned cows will also walk behind each other on concrete approaches, or "walkaways"; whereas horned "boss" cows appear to delight in horning the timid ones into the badly cut up mud areas of the yards and approaches thereto.

A new type of "leg-rope" in the form of a chain has been introduced of recent years with some success. Upwards of 30,000 of these patent leg-chains have been sold during the past few years, which suggests that they possess some attractive features which have appealed to the farmer. Further, at least 30,000 urine and manure-soaked hempen leg-ropes have been displaced. The patent chain is quickly applied to the cow's leg, it does not pull taut, it does not fray and wear, it is easily detached from the post, and it has the great advantage that it can be steamed and sterilized. It is remarkable how many of the competing farms have introduced these chains, and they are to be found in almost every area of the State.

Pasture Development.

Mr. W. Semple, of Rochester Association, and Mr. J. Bullingham, of Tongala, each scored the possible 100 points for their remarkable pastures. A review of the whole competition shows that all of the entrants use at least one bag of superphosphate per cow; whereas on some of the outstanding farms as much as 4 cwt. per acre is being used. This was the case on Mr. Semple's farm, where the carrying capacity exceeds one cow per acre. The judge stated that despite this heavy stocking of the farm there was ample fodder reserved, and the pastures were an excellent blending of perennial rye and Victorian wild white clover. At Mr. Bullingham's farm a similar result was evident.

There were also excellent pastures and lucerne stands on Messrs. Keele and Son's farm, as well as at Mr. J. D. Pierce's farm at Rochester. The pastures of Mr. S. Polmear, of Eskdale, and Mr. A. Crosthwaite, Kiewa Valley, were also of a high order, as were those of Mr. W. J. O'Brien, of Zone 2. Messrs. Freestone, Neilson, Wells, and E. J. Brisbane, of Zone 3, all had scores not far below that of Mr. Bullingham.

Mr. H. Woodruff, of Paschendale, had an excellent blending of perennial rye and subclover; while Mr. F. Denny had developed the trench pit silo, and ensiled over 230 tons of first-cut lucerne and meadow growth. In addition, both men had approximately 50 tons of baled meadow hay; in each case—well saved, and well covered.

Mr. J. M. Muir, of Bacchus Marsh, had splendid lucerne and pastures, while at Sale Mr. A. E. Langford was considered to have the outstanding pasture in Zone 7. Mr. W. Roberts and C. Dineen, of Yarragon, each obtained high scores for their pastures, red clover stands and fodder reserves.

In South Gippsland the pastures were not up to the usual high standard, mainly owing to the much lower rainfall during the spring months. Those of Messrs. W. Horne, Leongatha; D. and

Stacking grass hay at Messrs. D. and M. A. Poole's, Lang Lang.

M. A. Poole, Lang Lang; W. T. Pratt, Mountain View; J. Share, Korumburra; and Messrs. Bright, Wilson and Howell, of Zone 9, were considered to be among the best.

Fodder Reserves.

There are two forms of fodder reserve, viz. :—that which is built up during the growing period of each year, for the time when little or no growth can be assured, and there is the building up of reserve fodder in years of plenty, for the inevitable times of drought or lean periods, which sometimes occur for two or more years.

For the purpose of the dairy farm competition—since it is an annual event—the judge looks for a reserve of at least one ton of hay per cow or its equivalent in silage or root crops. This is the minimum requirement, and when it is in evidence—a score of 50 points is awarded.

It is sometimes stated that more attention should be given to the fodder held in reserve against the period of lean years. This is the ideal underlying the Royal Agricultural Society's scheme; and it has much to commend it. On the other hand, piling up huge reserves of fodder against the possibility of an outsize drought—or for sale—may not be as satisfactory on a dairy-farm as the utilization of most of the year's supplies; for it is certain that farms must be fully stocked if economic production is to be made. There is no doubt, however, of the wisdom of having a spare trench silo safely set apart for a time of scarcity. There are no costs for insurance, and there is little loss if the silage is well made. It will keep indefinitely, it is not likely to be sold, and it contains the much valued succulence for feeding stock when other foods are dry and scarce.

The Council of Herd Testing will give this and several other features its consideration before the conditions of next year's competition are made known; for it is fully aware of the excellent service that the competition is giving to competitors, and to the industry as a whole.

Feeding Wheat to Sheep

MANY owners have used wheat as a supplementary feed for sheep and have had excellent results, besides finding it economical at its present price. Four to five ounces per sheep per day is sufficient for dry sheep in paddocks in which there is some roughage. For the first week 1½ ounces per sheep per day should be given; this is increased by an ounce each successive two days until 4½ ounces is reached in eight days. Any trouble caused by feeding sheep on sound wheat usually occurs in the first week through some sheep getting too much before they become used to it.

The grain should be put out thinly on the ground so that all the flock can get at it at once. An excellent idea for the distribution on the ground is to use a rubber hose attached to a box on a cart; the flow of the grain on to the ground should be regulated by the pace of the vehicle which is driven around in circles until the ration has been given. If the paddocks become bare, half a pound of hay per sheep per day is required to take the place of the natural roughage.

London Markets

Weekly Prices

The following information as to prices offering in London for the principal Victorian primary products has been taken from cablegrams received each week by the Department of Agriculture from the Victorian Agent-General in London.

Product.	Price for Week Ending—				
	30th Dec.	6th Jan.	13th Jan.	20th Jan.	27th Jan.
	d.	*d.*	*d.*	*d.*	*d.*
Lamb, 1st quality, Victorian .. .. 29–36 lb. ..	7¼	7⅛	7	6⅞	6¾
Lamb, 1st quality, Victorian .. .. 37–42 lb. ..	7	6⅞	6¾	6⅝	6½
Lamb, 1st quality, other States .. 29–36 lb. ..	7⅛	7	6⅞	6⅞	6¾
Lamb, 1st quality, other States .. 37–42 lb. ..	6⅞	6¾	6⅝	6⅝	6½
Lamb, 2nd quality, Victorian .. .. 28 lb. and under	6¾	6⅝	6½	6½	6
Lamb, 2nd quality, Victorian .. .. 29–36 lb. ..	6½	6⅜	6⅛	6⅛	6½
Lamb, 2nd quality, other States .. 28 lb. and under	6¾	6½	6½	6½	6½
Lamb, 2nd quality, other States .. 29–36 lb. ..	6¼	6¼	6	5⅞	5⅞
Lamb, 3rd quality, all States .. .. 28 lb. and under	6¼	6⅛	6	5⅞	5¾
Lamb, 3rd quality, all States .. .. 29 lb. and over	6	6	5¾	5½	5½
Mutton wethers and/or maiden ewes .. Under 40 lb.	3¼	3¼	3⅛	3⅛	3⅛
Mutton wethers and/or maiden ewes .. 41–48 lb. ..	3¼	3¼	3⅛	3	3
Mutton wethers and/or maiden ewes .. 49–56 lb. ..	..	..	..	..	..
Mutton ewes .. .. Under 40 lb.	3⅛	3⅛	3	3	3
Mutton ewes .. .. 41–48 lb. ..	..	2⅞	2¾	2¾	2¾
Beef, frozen ox hinds .. .. 145–210 lb. ..	4¼	4¼	4¼	4¼	4¼
Beef, frozen ox crops, weights corresponding	3¼	3¼	3¼	3⅛	3
Beef, chilled ox hinds .. .. 145–210 lb. ..	5⅞	5⅝	5¾	5½	5⅛
Beef, chilled ox crops, weights corresponding	3⅝	3⅞	3½	3⅝	3½
Pork, Australian 1st quality .. .. 60–80 lb. ..	7⅝	7¾	7⅝	7⅝	7⅝
Pork, Australian 1st quality .. .. 81–100 lb. ..	7¼	7¼	7⅛	7	6⅞
Pork, New Zealand 1st quality .. 60–80 lb. ..	7⅝	7¾	7⅝	7⅝	7⅝
Pork, New Zealand 1st quality .. 81–100 lb. ..	7¼	7¼	7⅛	7	6⅞
	s.	*s.*	*s.*	*s.*	*s.*
Bacon, Canadian .. .. .. per cwt. ..	91	91	84	84	90
Bacon, Empire (cured in England) .. per cwt. ..	87	87	84	84	90
Bacon, Danish .. .. .. per cwt. ..	100	100	95	95	100
Butter, unsalted, choicest grade .. per cwt. ..	112–113	116–117	123–124	124–125	120–124
Butter, unsalted, 1st grade .. .. per cwt. ..	111	115	122	122–123	120–122
Butter, unsalted, 2nd grade .. .. per cwt. ..	..	..	..	..	..
Butter, unsalted, pastry grade .. .. per cwt. ..	..	..	..	..	..
Butter, salted, choicest grade .. .. per cwt. ..	110	115–116	122–123	121–122	119–121
Butter, salted, 1st grade .. .. per cwt. ..	109	114–115	121–122	120–121	118–120
Butter, salted, 2nd grade .. .. per cwt. ..	107–108	112–114	119–120	118–120	117–118
Butter, salted, pastry grade .. .. per cwt. ..	104–105	108	115–116	116	114–115
Butter, Danish .. .. .. per cwt. ..	142	142	142	136	135
Market (butter)	Firm.	Firm and active through-out the week.	Firm following good demand at advancing prices.	Slow through-out the week.	Quiet.

Agricultural Lime Act

Brands Registered for 1939

By W. C. Robertson, Chemist.

AN Act relating to the sale of agricultural lime was placed on the Statutes in 1934. This legislation was due to the insistent demand by the farming community for some control over, or standardization of, the various forms and brands of lime which were on the market. At this time some of the statements made by salesmen purveying agricultural lime were as remarkable as they were untrue, and lime works began to make their appearance in various parts of the State. However, propaganda based on the value of lime as a fertilizer with false and ludicrous comparisons with the well-known fertilizer, superphosphate, was anything but a firm foundation on which to build a satisfactory trade in agricultural lime. After a year or two of active inspectorial work under the Act, we find that the brand names of agricultural lime which are registered are mostly the well-known brands of the burnt lime trade.

Lime in both the burnt and unburnt condition has been used in agriculture since very early times, and it is almost indispensable at some period or another on land which is subjected to intense culture. As a general rule, the horticulturist, market gardener, nurseryman, and floriculturist favour burnt or slaked lime, while the dairyman or pastoralist who wishes to decrease the acidity of the soil and at the same time provide the lime to form "basic super" during the subsequent application of superphosphate usually decides to buy the cheaper mild lime, i.e., lime in the form of carbonate. It is a fact that soils with low pH figures, which denote excessive acidity, can be neutralized or corrected only by applying lime in one of its three forms, i.e., as oxide, hydrate, or carbonate.

The Agricultural Lime Act is modelled on the Fertilizers Act and requires that all brands of agricultural lime which are offered for sale must have a brand registered annually with the Department of Agriculture. Furthermore, all agricultural lime which is offered or exposed for sale must have a plainly printed label affixed to each and every bag, certifying the brand name and the proportion per centum of calcium oxide, and the form in which it occurs, the calcium carbonate equivalent, the percentage of magnesium oxide, and the amount per cent. of the agricultural lime passing through a sieve of twenty mesh. Other details such as the brand and the name and address of the manufacturer must also appear on the label. Of the nineteen brands of agricultural lime registered for the current year, four appear under the heading of Ground Burnt (Unslaked), seven under Slaked Agricultural, and eight under Ground Limestone or Chalk.

Burnt Lime.

The average analysis of the brands of ground burnt unslaked agricultural lime is as follows:—Lime (CaO)—81.1 per cent., Magnesium (MgO)—3.1 per cent., and the degree of fineness—74.5 per cent. The average price is £2 16s. 3d. per ton, which is equivalent to 8⅓ pence for each 1 per cent. of Lime (CaO) per ton.

Slaked Lime.

The seven brands of agricultural slaked lime have the following average analysis:—Lime (CaO)—58.6 per cent., Magnesia (MgO)—1.6 per cent., degree of fineness—76.4 per cent. The average price is £2 3s. 5d. per ton, which is equivalent to 8¾ pence for each 1 per cent. lime per ton.

Ground Limestone.

The average analysis of the brands of ground limestone is:—Lime (CaO)—46.8 per cent., Magnesia (MgO)—2.05 per cent., degree of fineness—77 per cent. The average price works out at £1 4s. 4d. per ton, which is equivalent to 6¼ pence for each 1 per cent. of lime per ton.

The value of these average commercial figures for 1 per cent. of lime is plainly shown when the percentage of lime guaranteed

under the various brands is multiplied by the unit value cited above. For example, to find the comparative value of any brand of—

1. Agricultural ground burnt lime—multiply percentage figure for Lime (CaO) by 8.3.

2. Agricultural slaked lime—multiply per cent. Lime (CaO) by 8.8.

3. Agricultural ground limestone—multiply per cent. Lime (CaO) by 6.25.

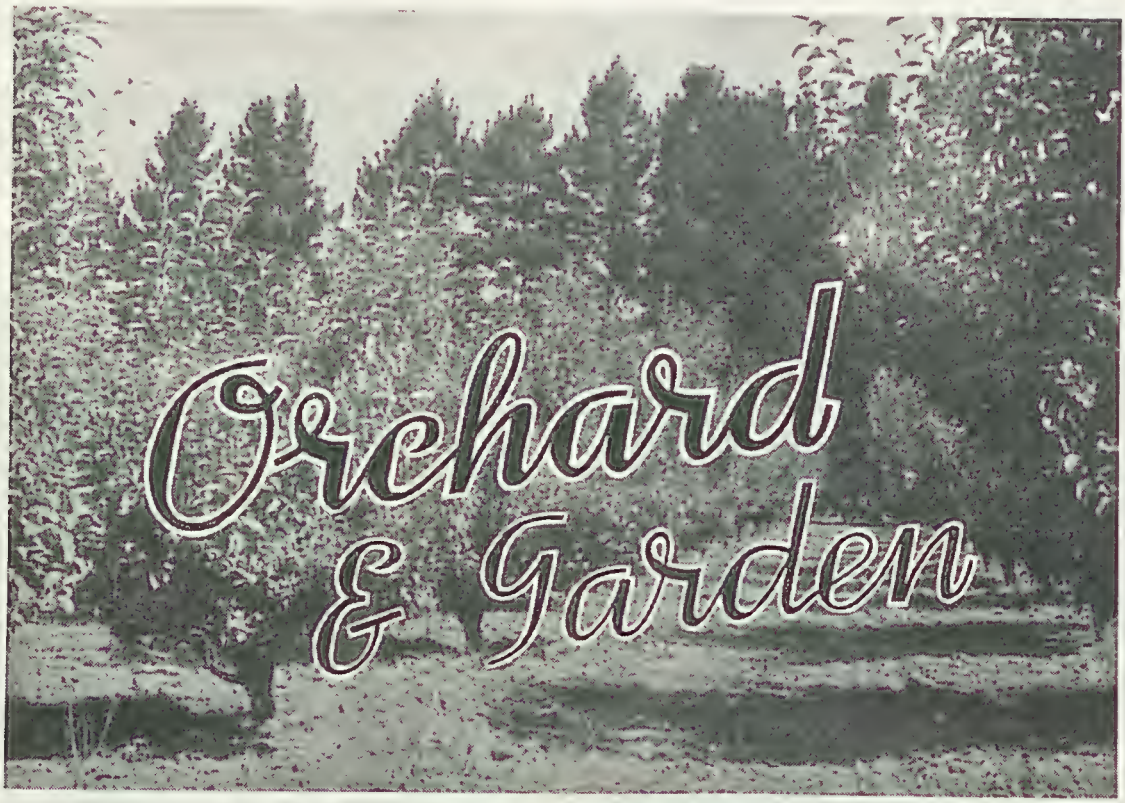
The answer is in pence per ton in each instance, and when compared with the registered price, and allowance made for cost of transport, the calculation may often mean the saving of many pounds to the purchaser.

LIST OF AGRICULTURAL LIMES REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE AGRICULTURAL LIME ACT 1934 (No. 4271) FOR THE YEAR 1939.

General Description.	Brand.	Calcium Oxide.	In the Form of—	Equivalent to Calcium Carbonate.	Magnesium Oxide.	In the Form of—	Degree of Fineness. Material Passing Through a 20-mesh Sieve.	Price per Ton in 11-ton Lots.	Manufacturer.
		%		%	%		%	£ s. d.	
Agricultural Lime. Ground Burnt (unslaked)	Lilydale, No. 1	87·70	Mainly oxide	156·90	5·00	Mainly oxide	60·00	3 0 0	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
" " "	" No. 2	80·00	"	143·00	5·00	"	50·00	2 5 0	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
" " "	Peninsula, No. 3	73·08	"	130·40	1·28	"	98·00	3 0 0	Peninsula Lime and Fertiliser Co., 70 Elizabeth-street, Melbourne
" " "	Kawa ..	83·80	"	149·70	1·20	"	90·00	3 0 0	P. Alkemade and Sons, 535 Little Lonsdale-street, Melbourne
Slaked Lime ..	Lilydale ..	55·00	Hydroxide and carbonate	98·30	3·00	Mainly hydrate	55·00	1 8 6	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
" " "	McCann's ..	60·00	"	107·00	1·10	"	80·00	1 15 0	John N. McCann Pty. Ltd., Kardinia-street, Geelong
" " ..	White Rock ..	60·00	"	107·00	2·00	"	70·00	2 0 0	White Rock Lime Co. Pty. Ltd., 19 Queen-street, Melbourne
" " ..	Snowflake ..	60·00	"	107·10	1·80	"	75·00	2 5 0	Evans Bros. Pty. Ltd., Yarra Bank-road, South Melbourne
" " ..	Bulldog ..	51·80	"	92·40	·80	"	65·00	2 5 0	Bulldog Lime Co. Pty. Ltd., 344 Swan-street, Richmond, E.1
" " ..	Peninsula A.G.	56·92	"	101·60	·99	"	100·00	2 10 0	Peninsula Lime and Fertiliser Co., 70 Elizabeth-street, Melbourne
" " ..	Kawa ..	66·70	"	119·10	1·20	"	90·00	3 0 0	P. Alkemade and Sons, 535 Little Lonsdale-street, Melbourne
Ground Limestone or Chalk	Lilydale ..	50·00	Carbonate	89·50	3·00	Carbonate	95·00	1 2 6	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
" " "	Applim ..	51·10	"	91·20	1·20	"	98·00	1 5 0	Ammonia Products Pty. Ltd., 360 Collins-street, Melbourne
" " "	Walker's No. 1	44·80	"	80·00	·61	"	75·00	1 5 0	David Walker, Waverley Lime Works, Lara
" " "	" No. 2	36·40	"	65·00	3·00	"	75·00	1 0 0	David Walker, Waverley Lime Works, Lara
" " "	Lara ..	46·00	"	82·00	1·50	"	80·00	1 10 0	Lara Fertiliser and Lime Co., Lara
" " "	Kurdeez ..	44·80	"	80·00	·80	"	65·00	1 5 0	Victorian Agricultural Lime Ltd., 422 Collins-street, Melbourne
" " "	Kawa ..	51·40	"	91·70	1·20	"	75·00	1 5 0	P. Alkemade and Sons, 535 Little Lonsdale-street, Melbourne
" " "	Lilydale Lime Nibs	50·00	"	89·50	5·00	"	51·00	1 2 6	David Mitchell Estate, Oliver's-lane, Melbourne, C.1

W. R. JEWELL, M.Sc.,
Chemist for Agriculture

Melbourne, 21st November, 1938.



By J. L. Provan, B.Agr.Sc., Senior Horticultural Instructor

Orchard Notes.

THE major activity in the orchard for this month will be the harvesting of matured fruits. In northern Victoria, under irrigation, W.B.C., Packhams, and Buerré Bosc pears will be picked, and the harvesting of these varieties is usually completed by the end of the third week. Canning peaches—Phillips, Goodmans, and a little later, Golden Queen and Pullars, will be picked. Early in the month prunes are picked up and dried. To obtain a satisfactory sample of prunes it is essential that they should be properly matured. The prunes which fall prematurely to the ground should be discarded, because if added to the matured fruit they will interfere with future processing and lower the quality of the product. The fallen fruit requires to be picked up frequently; otherwise sun-burn may spoil its appearance. Handle prunes carefully so that large ruptures in the skin are avoided. Damaged prunes become mushy during subsequent processing. Do not over-dry the fruit—sun-dried prunes should contain from 15 to 17 per cent. moisture, and should not be hard and harsh to handle.

In southern Victoria, picking of W.B.C. pears commences in late January and continues throughout February. Where water has been available for irrigation this season some high quality fruit will be picked. The appearance of the W.B.C., Packhams, and Buerré Bosc varieties is very good and some excellent packs should be available. Scarcity of water is affecting the size of the fruit in many districts, but fruit which was backward responds to irrigation, and an improvement in size can be noticed in ten days after the application.

To assist growers in the packing of export and local market fruit, charts, showing the various packs and grading regulations are available free on application to the Director, Department of Agriculture, Melbourne, C.2. Investigations have shown that packing with a comparatively large pocketing system conduces to better carrying of the fruit. The fruit is packed much higher than the top of the case and a very thin, flexible lid is used. The thin lid is essential if this pack is adopted and bruising is to be eliminated. To be able to guarantee full weight of fruit in the case

it is necessary to pack the fruit to *recognized counts* instead of the obsolete method of packing to sizes alone. This is particularly important with our main export variety—Jonathan.

Valencia Late oranges should be harvested before they lose quality. This variety, if allowed to remain on the trees too long, will frequently revert to the green colour, lose flavour, and shrivel. The market during February is usually favorable, but last season many growers held this variety too long and returns slumped, because quality had deteriorated.

Very frequently little attention is given to the harvesting of almonds. The trees are frequently grown as windbreaks and, consequently, the crop is regarded as of little importance. Growers are advised, however, to handle almonds so that maximum returns can be obtained for them. The following points should be observed:—

Keep different varieties separate, and thoroughly dry all nuts before bagging. The almonds should be free from all husks, sticks, and other extraneous matter and be clean and free from infection by weevil or grub. The use of chapman sacks is preferred to chaff bags for bagging, and a tag bearing the name of the grower and the variety should be attached to each bag.

Inquiries made recently from a commercial house in Melbourne, which handles large quantities of almonds, revealed that the varieties in their order of preference are as follows:—Hatch's Nonpareil, Golden State, I.X.L., Ne Plus Ultra, Paper-shell (early and late), Riverside Peerless, Harriott's Seedling, Brande's Jordan, Chellaston, and Burbank. Hatch's Nonpareil and Golden State are reserved for special table kernels, and Ne Plus Ultra, Paper-shell, and Harriott's Seedling are usually shelled.

The Flower Garden.

By A. W. Jessep, M.Agr.Sc., B.Sc., Dip. Ed. Principal, School of Horticulture, Burnley

THE continued dry weather has made gardening much more arduous than it would otherwise be. However, one of the fascinations of gardening is watching the result of careful attention to the plants, and a lesson to be learned this abnormally dry season is that, by careful hoeing after each thorough watering, and the intelligent use of a straw mulch, some plants will grow relatively well even though very little moisture is available. In normal years, the majority of gardeners waste water. This wastage causes the surface of the heavier types of soil to cake and after-treatment is made more difficult.

Seeds that may be sown this month include Iceland poppies, antirrhinum, calendula, winter-flowering sweet peas, carnations, pansies, and violas. Plant out seedlings of Iceland poppies, African marigolds, pentstemons, carnations, zinnias, and stocks. Now is also the time to plant such perennials as daffodils, freezias, hyacinths, crinums, iris, agapanthus, and watsonias. Make the area ready for planting anemones and ranunculus as soon as the weather breaks. March and April are the best months to plant corms of these plants.

Some shrubs and trees are showing their delight in the dry conditions, and seemingly any of the following plants which have stood this season so well would do well in gardens normally dry and facing the north:—

1. *Jacaranda.*—This grows to a height of about 30 feet, but only slowly. It is frost-tender for the first year or so, but when once established withstands Victorian winters quite well. It should be planted in October. It has very attractive pinnate leaves and produces large lavender-coloured bell-shaped flowers about Christmas time.

2. *Erythrina* (The Coral Tree).—There are several species including the small-growing *E. Blakei,* which bears large sprays of deep red pea-shaped flowers, each of them more than 1 inch in length. It stands heavy pruning and may be kept down to a few feet. *E. Speciosa* is a medium-sized deciduous tree and produces large sprays of brilliant red pea-shaped flowers in the spring before its leaves appear.

3. *Brachychiton* (*Sterculia*) *acerifolia* (The Illawarra Flame Tree).—This is rather a slow grower and has a very thick trunk and large leaves, somewhat like those of the maple. In midsummer, it drops its leaves just before the

large bunches of scarlet bell-shaped flowers open. It has been very conspicuous this year.

4. *Lantanas.*—Some of the Lantanas become a pest in Queensland, but under Victorian conditions they do not seed and consequently there is no danger of their getting out of bounds. They are small shrubs with bright clusters of flowers, and are very useful to grow in dry corners.

Gladioli

There are many other plants that can be recommended for hot dry places, such as bottle brushes, large flowering West Australian gums, tecomas, Lagunaria (the Norfolk Island hibiscus), the silky oak, the barberry, veronica, and the Cape chestnut.

The rose-bed should receive special attention this month to ensure good autumn blooms. In cutting off the spent flowers make the cut just above a good strong bud; remove any dead wood and, if possible, give the bushes a good watering. As soon as the bed is dry enough, run the Dutch hoe over it. Give a good mulching of straw manure, but if no straw manure is available, use lawn cuttings, &c. A dressing of market garden manure at the rate of 2 oz. per bush should be well scattered over the whole bed.

Commence to force the dahlias along now with a good top-dressing of market garden manure at the rate of 2 oz. per plant well scattered over the bed. Water this in and when dry enough, Dutch-hoe the bed and then add a straw mulch. This mulch will save water, stop the soil from setting hard, and give a more uniform temperature. Tie the plants to stakes when they are tall enough.

Vegetable Growing.

The dry weather has also made the growing of vegetables extremely difficult with the result that their price is very high. The householder with his small, well-protected plot should be able to grow lettuce, beans and rhubarb by careful cultivation and an occasional watering.

Make further sowings of French beans, peas, lettuce, turnips, cabbage, and cauliflowers. If seeds of quick-maturing cabbages, such as Eastham and Enfield Market, are planted now the heads will be fit to cut about June. With cabbages, it is very important to sow the variety suitable to the season, as there are definite seasonal types.

Prepare the area now in which to plant onions during March. The seed may either be sown in rows and then thinned out and the thinned-out plants either used for further plantings or for salads, or the seed may be sown in a seed-bed and the seedlings transplanted into rows about 1 foot apart, with from 4 inches to 6 inches between the plants. The disadvantage of sowing in seed-rows is the thinning-out and weeding of the plants in the early stages. Onions transplant so easily that for small lots it is better to transplant them.

They will grow in any reasonably good soil as long as it is not too sticky. For culinary purposes, they may be used at any stage of their growing period and the matured bulbs may be stored. Early onions require about four months to mature and the main crop, such as Brown Spanish, from five to six months.

[*Continued on page* 104.

Crystallized, Candied, and Glazed Fruits for Home Use

By Miss A. Knight

ALMOST any variety of fruit may be preserved by crystallizing, candying, or glazing, but those generally favoured are cherries, apricots, plums, pears, small oranges, kumquats, pineapple, and, to a lesser extent, quinces, melons, peaches, and gooseberries. The fruit should be thoroughly saturated with a very strong syrup, but if this is done too quickly, the fruit will shrivel and become hard and tough; therefore a better result will be obtained by a gradual process. The use of a saccharometer, or float gauge, for testing the density of syrups would be an advantage.

The fruit is softened by boiling, so that it will more readily absorb the syrup, and be less likely to shrivel. If the fruit is soft and overripe it will break up in the boiling, and have a very poor appearance when finished; so choose nice firm-ripe fruit, and if possible with unblemished skins. Three parts cook, as too much cooking will, of course, break the fruit, and too little will result in too slow a penetration of sugar, resulting in a darkness in colour.

When three parts cooked, allow it to drain, and make a syrup by boiling ½ lb. sugar to each pint of water. The water in which the fruit was boiled may be strained and used for this purpose. It takes about a pint of water for each pound of fruit. Pour this hot syrup over the drained fruit, and allow it to steep for 24 hours, then drain it off, bring the syrup to the boil, and add 6 oz. of sugar for each pint of water used at the commencement. Boil it for about five minutes, and then pour, hot, over the fruit. Again strengthen the syrup in this way on three successive days, skimming each time if necessary; then let the fruit steep for three or four days after the final addition. That makes a total of 2 lb. of sugar to a pint of water. During this steeping the fruit must be kept well under the syrup.

After the final steeping the fruit is ready for drying. To drain lift the fruit out carefully, and put it on a sieve or wire tray over a plate and when well drained, put the tray in a very cool oven (about 115°F. or 120°F.) to dry. When evenly dried, free from stickiness and easy to handle, it may be stored away ready for use, but if a better finish is desired, it may be crystallized, glazed, or candied by further processing.

Crystallizing.

To crystallize fruit, make a fresh syrup by heating 3 lb. sugar to each pint of water till it reaches 220°F. or 222°F., that is "strong thread" or "pearl" degree. Now draw the pan aside, and allow the syrup to remain undisturbed till it has cooled off a little, then pour it over the fruit, which should be placed in single layers on wire trays or shallow dishes and covered with a damp cloth. Leave undisturbed until a thin crust of sugar forms on the top (about ten or twelve hours). The syrup should then be poured off carefully, and the fruit well drained, and put in a very cool oven until dry. It will then be covered with clear crystals.

Glazed Fruit.

Make fresh syrup with 1 lb. sugar to ¼ pint water boiled to 300°F. (hard crack degree). Thoroughly dissolve the sugar before boiling heat is reached. When the right degree is attained, put a little in a cup, keeping the bulk covered and in a warm place. Dip the fruit into the syrup in the cup, then place on a wire tray or plate to drain. As soon as the syrup in the cup shows a cloudiness discard it, and take a fresh supply from the pan. When all is dipped dry in a cool oven, and when finished it should have a clear glossy or glazed surface.

To Candy Fruit.

Prepare fresh syrup with 1 lb. sugar to ½ pint of water, and boil to 230°F. (feather degree), then remove the pan from the fire, and stir the syrup till a very slight cloudiness appears. Be careful not to overdo this, or it will become coarse-grained. Keep the pan of syrup in a vessel of hot water so that the temperature will be maintained. Dip the fruit in and out as

quickly as possible, and place on a tray to drain, then put in a very cool oven till the candy is set.

Any syrup that remains after the steeping of fruits may be used in different ways, such as sweetening puddings and sauces, making fruit gelatines for sweets, or it may take the place of sugar in pickles, chutneys, &c.

Cherries.—Light coloured cherries should be selected for this purpose, and should be stoned as carefully as possible so as to avoid tearing the flesh unnecessarily. They are immersed in boiling water for a few minutes, drained, and then put into the steeping syrup as described. Cherries are sometimes artificially coloured by adding a few drops of the desired colouring matter to the steeping syrup.

Pineapple.—Peel and cut the fruit into blocks or slices and treat, as described.

Apricots should be stoned either by cutting down one side, or making a small slit underneath and pushing the stone from the other end with a skewer or knitting needle. The fruit is then dipped into the boiling water for a few minutes, or steamed, and then put into the steeping syrup.

Plums are treated in the same way as apricots.

Melon should be peeled, seeded, and cut into blocks or slices, and three parts cooked, then treated in the same way as pears.

Figs.—Select the figs before they are fully ripe. Flavour the steeping syrup with ginger, and simmer the fruit in this until nearly cooked. Then proceed as described.

Small Green Oranges.—Very small oranges should be chosen. They should be soaked in brine (¼ lb salt to 1 pint water) for a few days, then rinsed, and boiled in fresh water to which a pinch of carbonate of soda has been added. Simmer for about 20 minutes, then drain and put into the steeping syrup. Finish as described for other fruits.

Gooseberries.—Deep red fruit should be topped and tailed, then put straight into the steeping syrup.

Pears.—The Williams Bon Chretien and the winter pears may be crystallized. When using the winter varieties they should be peeled, but the stems left. They are then very gently boiled in the steeping syrup each day so as to gain the deep red colour. When using the Williams or other soft white pears, they are partially cooked only before being steeped. The syrup may be flavoured with ginger if desired.

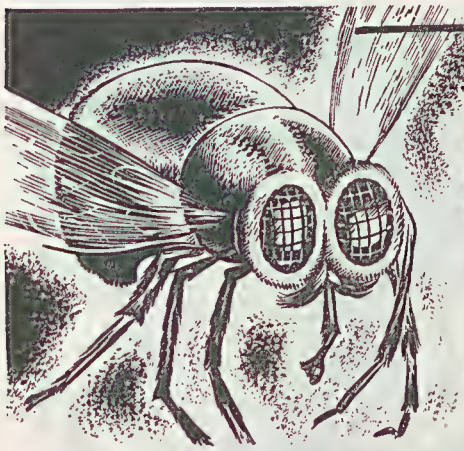
Quinces.—They should be peeled and cut into sections and treated as winter pears.

Peaches.—Peaches should be peeled, stoned, and cut into desired sizes, then treated in a similar manner to apricots.

Orchard and Garden Notes

(*Continued from page* 102.)

There are a number of varieties on the market, and it is advisable to grow a white skin for immediate use and a brown one for storage. Odourless is a large onion with a very mild flavour; unfortunately, it is not a good keeper. Silverskin is a rather small type of the white skin variety, and is very good for culinary purposes during the growing stages. Brown Spanish is the most popular commercial onion; it is a good grower and a particularly good keeper. Prizetaker is a very large onion which has a medium-strength flavour, but when grown to a large size, does not keep very well.



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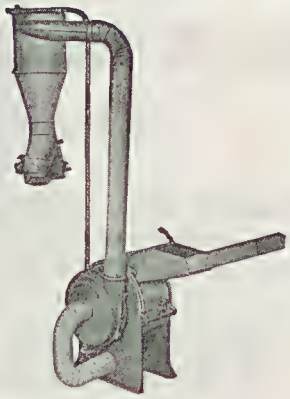

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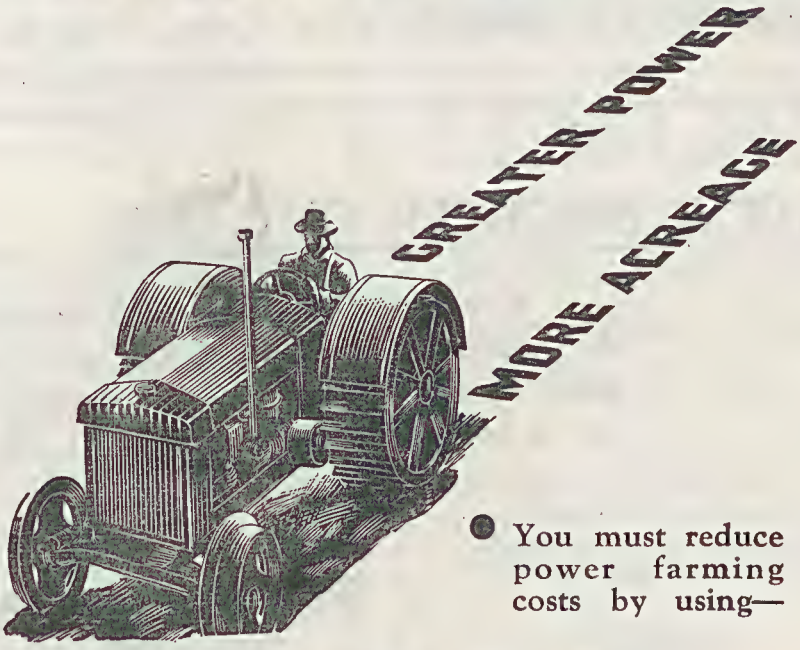

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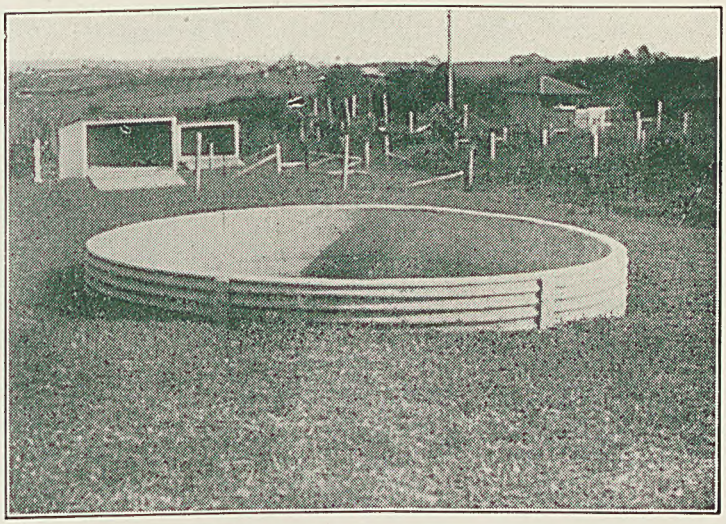

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